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U.S. Department of Agriculture  
Animal and Plant Health Inspection Service  
Wildlife Services

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**WATERFOWL POPULATIONS  
AND BREEDING CONDITIONS  
SUMMER 1954**



**SPECIAL SCIENTIFIC REPORT-WILDLIFE No. 27**

**UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
CANADIAN DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES  
CANADIAN WILDLIFE SERVICE**

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WATERFOWL POPULATIONS AND BREEDING CONDITIONS - SUMMER 1954



Special Scientific Report - Wildlife No. 27

United States Department of the Interior . . . . . Douglas McKay, Secretary  
Fish and Wildlife Service . . . . . John L. Farley, Director

Canadian Department of Northern Affairs  
and National Resources . . . . . Hon. Jean Lesage, Minister  
Canadian Wildlife Service. . . . . W. Winston Mair, Chief

Washington, D. C. - February 1955

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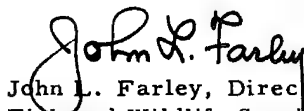
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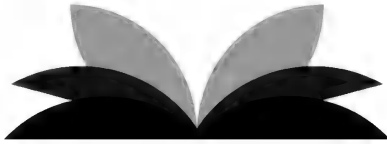
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## FOREWORD

This is a compilation of reports on waterfowl breeding ground conditions in 1954. It is a joint compilation by the Canadian Wildlife Service and the United States Fish and Wildlife Service and many Provincial and State Game Departments. It is published as the eighth report in a series begun in 1947 to record annual breeding ground conditions for our migratory waterfowl.

  
John L. Farley, Director  
Fish and Wildlife Service

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## WATERFOWL BREEDING GROUND SURVEY IN ALASKA - 1954

Urban C. Nelson, Robert F. Scott and  
John L. Buckley

### Introduction

Counts of waterfowl from aircraft flying sample transects over some of the known important Alaska breeding grounds have been made by Fish and Wildlife Service personnel in Alaska since 1949. The location, intensity, and adequacy of these samples have been modified each year by elimination of low production and remote areas, concentration on the more important waterfowl species, stratifying areas of similar production, and reducing the sampling error.

Production studies and banding activity were increased this year. John L. Buckley and Robert G. Kirkpatrick of the Cooperative Wildlife Research Unit continued work in the Minto Lakes area. Calvin J. Lensink returned for the second season on the Fort Yukon flats. Refuge personnel Russel R. Hoffman, David C. Hooper, and James Peterson worked on the Yukon Delta, Innoko River and Lake Louise areas. Federal Aid biologist Sigurd T. Olson returned to the Copper River Delta for the third year.

### Sampling Methods and Area Covered

Aerial Surveys in 1954 of waterfowl breeding populations were designed to obtain a stratified random sample of the major breeding grounds south of the Brooks Range. The Seward Peninsula, Aleutian Islands, and Southeastern Alaska were entirely omitted, and surveys were generally restricted to areas within which breeding densities were estimated at one pair per square mile or greater. Areas surveyed were combined into six strata, with sampling intensities jointly proportional to the relative area and the variance previously experienced in each stratum. Sampling intensity averaged 0.2 percent for all strata.

Transects were 1/4 mile wide and 16 miles long. A total of 3088 linear miles of transect were flown, by six different crews, between May 25 and June 14. Only "game" ducks were counted, and the tally was designed to inventory breeding pairs. Single ducks of either sex were recorded as one pair, and flocks of eleven or more were disregarded unless obviously paired. Lone drakes were not recorded in a manner to permit separate treatment of this segment of the population. Abundance of water areas is not a seriously variable factor on Alaskan breeding grounds and no water data were recorded on the transects.

Field work on the Innoko River, Lake Louise and Copper River areas concentrated on banding activity while work on the Minto Lakes, Fort Yukon Delta areas was concerned with both banding and production studies. More ducks were banded than in any previous year in Alaska. Some progress was made in the use of nets and traps for capturing waterfowl particularly on Minto Lakes and at Fort Yukon, however, further improvement in capturing technique will be required before banding can be undertaken on a large enough scale at reasonable cost to yield significant mortality data.

### Weather and Water Conditions

There appear to be but two major environmental variables that can be consistently measured annually at the start of the Alaskan waterfowl breeding season. One is the date of spring breakup throughout the Territory, with its associated impression of "late" or "early" spring. The other is the relative volume of spring run-off waters, which often reach major flood proportions in some areas. The degree of correlation between either of these factors and the subsequent success of waterfowl production is still unknown.

This year, spring was "late" in southern Alaska, but "early" in northwestern Alaska. No unusually high water was reported anywhere, and much of the Interior began the summer with water levels below normal. This was particularly true of those lakes and ponds in the Fort Yukon Flats and Minto Flats that are not connected to the main river drainages. These waters apparently depend on periodic floods to fill them to capacity. Water shortage did not adversely affect production anywhere.

### Breeding Population Indices

Where comparisons of the data from 1954 surveys can be made with previous years data, no significant changes in waterfowl numbers are noted. Statistically, the "sampling error" was within acceptable limits, and this years' sampling can be considered a success from this standpoint. Whether or not the survey accurately reflects total waterfowl populations, composition and distribution is another question which will require continued lengthy examination. Waterfowl densities, both breeding pairs and broods, reported by air counts have been inconsistent with ground counts to a degree unexplained by errors in either method. Species composition, Table VII, as reported from aerial counts by competent biologists is so variable as to render the data of little value in reflecting changes in species composition of the population.

### Production Indices

The average clutch size (Table III) at Minto Lakes was less in 1954 than in previous years, except for scaup which had larger clutches. At Fort Yukon all species had smaller clutches than in previous years. Heavy rains at Minto Flats in late July brought about flooding and destroyed late nesting and reneating diving ducks.

Nesting success, Table VIII, was less at Fort Yukon this year than in 1953 and at Minto Lakes the success was greater. The factor of nesting success is not properly measured since disturbance by man induces predation and abandonment and consequently observations are biased.

There was a significant decrease in the size of brant broods and a significant increase in cackling goose broods (Table IV). The size of broods of other geese were near normal. Duck broods were generally smaller than in previous years (Table V) in all areas where information is available. Significant reductions in size are noted in the Fort Yukon and Minto Lakes area, however, the decrease in the latter area is offset by an increase in the number of broods. Pintail broods, based on an adequate number of observations were smaller than in previous years.

### Summary

June aerial transects reveal no important changes in waterfowl densities or composition. Average clutch and brood size were generally lower in 1954 than in previous years. Brant and Pintail broods were smaller and Cackling geese broods were larger. Minto Lakes production in 1954 was greatly improved over 1953. The information from other areas reveal no significant data to predict a great change in the 1954 fall flight.

Table I. - Results of Spring Aerial Surveys, Alaska - Breeding Population Data - Ducks\*

Stratum No.	Location	Area in Sq. Mi.	No. of 16 Mi. Tran.	Dates of Surveys	Mean Density Pairs Per		Pop. Ind. Tot. Br. Pairs	Range Prs. Per Tran.	Stand. Dev. Prs. Per Tran.	Sampling Error ** ±
					Sq. Mi.	16 Mi. Tran.				
1a	Misc. Low Density Areas	189,120	48	5/25 - 6/14	0.9	3.73	170,208	0-18 (18)	4.65	36
1b	Lower Innoko	3,584	1	6/12	1.7	7.00	6,093	-	-	-
1c	Selawik	1,472	2	6/8	5.2	21.00	7,654	15-27 (12)	8.48	364
1d	Susitna	7,638	2	6/1	1.9	7.50	14,512	7-8 (1)	0.71	85
Total		201,814	53	5/25 - 6/14	1.1	4.58	221,995	0-27 (27)	5.69	34
2a	Alaska Pen.	14,144	8	5/25 - 5/27	4.2	17.00	59,405	4-44 (40)	11.99	59
2b	Upper Innoko	2,624	2	6/2	8.0	32.00	20,992	32-32 (0)	-	-
2c	Kobuk Delta	760	1	6/8	8.5	34.00	6,460	-	-	-
2d	Yukon Delta	24,960	15	6/13	3.2	12.80	79,872	1-34 (33)	10.73	46
Total		42,488	26	5/25 - 6/13	4.1	16.38	174,201	1-44 (43)	12.02	30
3	Koyukuk	6,464	5	6/7	2.6	10.48	16,806	1-30 (29)	11.54	138
4	Lake Louise	8,384	10	6/4	4.0	16.10	33,536	1-28 (22)	7.20	32
5a	Minto Lakes	2,048	4	6/2	11.1***	44.50	22,733	16-90 (74)	31.86	114
5b	Ft. Yukon Flats	18,368	34	6/3 - 6/5	10.0	40.00	183,680	2-81 (79)	20.62	18
5c	Tanana-Kuskokwim	30,720	53	5/26 - 6/8	3.6	14.40	110,592	0-134 (134)	27.26	52
Total		51,136	91	5/26 - 6/8	5.6	22.24	286,362	0-134 (134)	26.44	25
6	Copper R. Delta	1,536	8	5/26	39.1	156.62	60,058	37-288 (251)	88.91	48
All Strata Combined		311,822	193	5/25 - 6/14	2.6 (Weighted)	10.26 (Weighted)	798,264	0-288 (288)	0.77 (Weighted)	15

Table I. Continued

- \* Excludes scoter, eider, merganser, geese and brant.
- \*\* Confidence limits expressed as a percentage of the mean.
- \*\*\* Eight additional transects change the estimate to 12.5 pairs in 1954 compared to 12.3 in 1953, but ground estimates indicate considerable increase in 1954 over 1953.

Sampling error  $\pm$  27 percent in 1953 and  $\pm$  70 percent in 1954.

Table II. - Results of Spring Aerial Surveys, Alaska - Species Composition.

Stratum No.	Location	Total Pairs Tallied	Percent Identified	Species Composition - Approximate Percentage							Golden-eye	Bufflehead	Canvasback
				Mallard	Pintail	Teal	Baldpate	Shoveler	Gadwall	Scaup			
1a	Misc. Low Density Areas	179	50	21	13	2	14	-	-	47	1	-	tr.
1b	Lower Innoko	7	100	43	29	-	-	-	-	29	-	-	1
1c	Selawik	42	48	-	50	5	-	-	-	45	-	-	-
1d	Susitna	15	93	36	21	14	7	-	-	21	-	-	-
		243	54	21	21	4	11	-	-	43	tr.	-	tr.
2a	Alaska Peninsula	136	49	10	27	6	4	1	-	49	1	-	-
2b	Upper Innoko	64	97	53	32	5	2	-	-	8	-	-	-
2c	Kobuk Delta	34	38	23	15	15	8	-	-	38	-	-	-
2d	Yukon Delta	192	93	25	23	4	4	1	3?	33	5	2	-
		426	75	27	25	5	4	1	2?	32	3	1	-
	Koyukuk	52	44	-	17	-	35	4	-	43	-	-	-
	Lake Louise	161	92	17	9	5	25	-	-	34	7	2	-
5a	Minto Lakes	178	67	14	13	-	26	4	-	32	tr.	7	3
5b	Ft. Yukon Flats	1084	51	9	26	1	9	tr.	-	46	tr.	2	4
5c	Tanana-Kuskokwim	762	75	21	6	6	8	1	-	38	4	14	tr.
		2024	62	15	16	4	10	1	-	41	2	8	3
	Copper River Delta	1253	77	21	35	2	8	7	1	24	tr.	tr.	-
	All Strata Combined	6852	66	18	21	4	10	2	tr.	36	2	5	1

Table III. - Clutch Size, Alaska, 1951, 1953, 1954 - Ground Surveys  
Average No. of Eggs per Nest and No. of Nests Observed.

Species	Minto Lakes			Fort Yukon	
	1951	1953	1954	1953	1954
Baldpate	7.5 (2)	8 (1)	5 (1)	7.7 (3)	7 (2)
Mallard	8.6 (5)	8 (1)		7.0 (1)	8 (1)
Pintail	6.2 (14)	7 (2)	5 (1)	6.8 (9)	6.3 (4)
Shoveler	8.3 (7)	-		10.8 (5)	9.0 (1)
Canvasback	9.0 (1)	-	8.3 (4)	8.9 (11)	7.5 (4)
Scaup, Lesser & Greater	8.4 (59)	8.5 (4)	8.9 (39)	9.5 (16)	9.3 (52)

Table IV. - Brood Size, Alaska, 1951, 1952, 1953, 1954 - Ground Surveys  
Average Size and No. Observed - All Age Classes.

	1951	1952	1953	1954
Copper River Delta -				
Canada Goose		5.4 (12)	4.3 (31)	4.8 (27)
Yukon Delta -				
Black Brant	3.4 (298)	-	2.8 (143)	2.0 (224)
Cackling Goose	3.7 (123)	-	4.5 (24)	4.8 (58)
Emperor Goose	5.0	-	-	5.3 (10)
White-Fronted Goose	5.4	-	-	6.7 (3)

Table V. - Brood Sizes, Ducks, Alaska - Ground Surveys, Average Size and Number of Broods Observed,  
All Age Classes - 1951 - 1954.

Species	Fort Yukon		Minto Lakes				Copper River Delta			Yukon Delta	Innoko River	Lake Louise
	1953	1954	1951	1952	1953	1954	1952	1953	1954	1954	1954	1954
Baldpate	7.2(51)	6.1(130)	7.0(7)	5.9(8)	7.3(38)	6.2(75)	7.5(4)	6.6(11)	6(4)		4.6(47)	5.4(42)
G-w. teal	8.2(8)		7.2(9)	7.7(7)	7.2(18)	5.5(16)	6.0(1)	4.7(7)	6(3)			4.1(16)
Mallard	7.4(11)	5.6(50)	7.7(11)	-	5.5(8)	5.6(25)	5.3(3)	6.1(18)	5.7(19)	4.1(48)		3.8(6)
Pintail	6.6(31)	5.3(89)	6.2(72)	5.8(8)	5.6(35)	4.6(109)	5.0(4)	5.5(66)	5.5(70)		4.4(212)	4.5(20)
Shoveler	8.3(7)		7.4(11)	7.3(7)	7.5(12)	7.2(35)	5.0(1)	5.2(4)	7(1)	6.0(8)		-
Scaup	8.1(24)	6.4(108)	7.7(8)	6.6(46)	7.6(106)	6.6(80)	-	6.5(18)	6.8(17)	-		7.1(39)
Canvasback			5.2(6)	5.0(9)	6.6(2)	6.0(19)				-		
Gadwall	-	-	-	-	-	-	7.6(6)	5.5(2)		-		-
Golden-eye						7.5(4)				-		5.0(6)
Bufflehead						7.5(4)				-		5.0(3)
W. W. Scoter				7.6(5)	7.8(5)	7.0(2)				-		7.5(2)



Table VI. - Breeding Pair and Brood Counts, Ducks, Alaska, 1954.

Area	Fort Yukon		Minto Lakes		Yukon Delta	Copper River Delta
	1953	1954	1953	1954	1954	1954
Aerial transect counts, June Prs. per sq. mi.	8.4	10*	12.3	12.5	3.2**	39.1
Ground counts, July Broods per sq. mi.	17.2	12.5	-	-	36.1**	4.1
Combined aerial-ground counts July-August Broods per sq. mi.	-	-	-	9.97	-	-
Aerial counts, July Broods per sq. mi.	-	-	4.75	-	-	-

\* Ground counts estimate 50 per square mile on sample study area.

\*\* Areas not comparable.

Table VII. - Nesting Success, Alaska, Comparison 1954 with 1951, 1953-  
Percent Successful and Number of Nests.

Species	Fort Yukon		% Success- ful	1951	Minto Lakes	
	1953	1954			1953	1954
Baldpate	67(3)	0(2)		50(2)	?(1)	0(1)
Canvasback	62(8)	25(4)		100(1)		75(4)
Mallard	0(1)	100(1)		40(5)	100(1)	-
Pintail	67(9)	100(4)		68(14)	100(2)	0(1)
Shoveler	80(5)	50(3)		34(7)	100(1)	-
Scaup	23(13)	29(52)		18(59)	33(12)	44(39)
Other	-	100(2)		66(3)		50(2)
Total	56(39)	34(68)		30(91)	50(17)	45(47)

Table VIII. - Birds Banded in Alaska, 1954.

Geese and Brant	Adults			Immature (local)			Total
	Male	Female	Sex not Determined	Male	Female	Sex not Determined	
Western Canada	27	32	13	332	322	30	756
Lesser Canada	26	30	-	222	167	1	446
Cackling	1	-	-	111	106	-	218
White-fronted	87	99	-	16	26	-	228
Emperor	-	-	-	18	29	1	48
Snow	-	-	-	1	-	-	1
Black Brant	397	467	1	23	47	0	935
Total	538	628	14	723	697	32	2632
<u>Ducks</u>							
Pintail	241	264		180	146	3	917
Baldpate	53	15		150	52	1	364
Mallard	4	2		67	63	-	126
G-w. teal	23	3		52	69	-	141
Shoveler	4	3		70	1	-	146
Gadwall	2	-		2	5	-	5
Spectacled Eider	-	-		2	-	-	7
Pacific Eider	--	-		1	45	-	1
L. Scaup	8	32		70	8	-	128
G. Scaup	3	13		9	158	-	20
Unidentified Scaup	-	-		155	3	-	352
Golden-eye	2	2		3	13	-	10
Canvasback	-	3		20	13	-	36
W.W. Scoter	-	-		21	16	-	37
Bufflehead	21	1		9	8	-	39
Total	361	338	151	811	817	4	2331
<u>Other Birds</u>							
						66	66
Total All Birds							5029

# WATERFOWL BREEDING GROUND SURVEY IN NORTHERN ALBERTA, THE NORTHWEST TERRITORIES AND THE YUKON

1954

Robert H. Smith and Everett L. Sutton

## Introduction

This report covers the seventh aerial survey of waterfowl breeding populations and the third survey of waterfowl production in the title area.

Population surveys were begun in central Alberta at the southern edge of the Close Forest on May 28 and were concluded in the MacKenzie Delta on June 25. Production surveys were begun on July 10 and continued through August 3, covering the same areas as in the population survey.

During the population survey we were assisted by Dr. Gustav A. Swanson of Cornell University and during a portion of the production survey by Mr. John A. Biggs, Director of the Washington Department of Game.

## Survey Methods

In general, work began at the southern edge of the area and progressed north as the country opened up; the same procedure being followed during the production survey, following up brood emergence. Transect widths were 1/4 mile in the initial surveys and 1/8 mile in the latter, data being recorded on all waterfowl observed (with the exception of scoters, eiders, old squaws and mergansers) by species as to pairs, single birds, groups and broods, with the broods being further broken down as to age class and the number of ducklings per brood.

## Weather and Water Conditions

1954 was one of the latest seasons on record - a cold backward spring with a late breakup. This may have had an adverse effect on the normal northward migration of waterfowl, as certainly the early arrivals found only ice and snow.

Flooding occurred in the Athabaska, Lake Claire marshes resulting in considerable nest losses. Elsewhere water conditions were normal or even improved over 1953. Specific areas of improvement were the Slave River Parklands and the area of Close Forest north of Great Slave Lake.

Following the late spring, the summer was warm and bright. There were no storms of severe enough proportions to affect nesting waterfowl.

### Breeding Population Trends

(1953 Figures Corrected to Eliminate Scoters, Mergansers, Eiders and Old Squaws.)

Table I. - Lake Claire - Athabaska Delta, Alberta, 2,000 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	50.4	19.6
Est. pop. index	100,744	39,199
% change from previous year		- 61.1%

#### Percent Species Composition-1954

Species	Percent	Species	Percent
Mallard	27.9	Bufflehead	2.7
Canvasback	17.6	Golden-eye	2.7
Pintail	13.1	Ruddy duck	2.7
Scaup	9.6	Gadwall	2.4
Redhead	8.0	Green-winged teal	2.1
Baldpate	5.0	Ring-necked	1.5
Shoveler	3.8	Blue-winged teal	0.9

Table II. - Hay Lakes, Alberta, 200 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	123.8	99.0
Est. pop. index	24,768	19,801
% change from 1953		- 20.1%

#### Percent Species Composition-1954

Species	Percent	Species	Percent
Mallard	34.2	Green-winged teal	2.3
Redhead	12.1	Scaup	1.7
Baldpate	11.8	Bufflehead	1.7
Canvasback	10.5	Golden-eye	1.2
Shoveler	10.0	Ring-necked	.6
Pintail	9.5	Gadwall	.4
Blue-winged teal	3.6	Ruddy duck	.4

Table III. - Slave River Parklands, Northwest Territories - 4,025 Square Mile.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	2.0	9.5
Est. Pop. index	8,112	38,241
% change from 1953		+ 375%

Percent Species Composition-1954

Species	Percent	Species	Percent
Mallard	32.5	Green-winged teal	9.5
Pintail	20.2	Shoveler	5.8
Scaup	13.2	Golden-eye	4.3
Baldpate	12.3	Bufflehead	2.2

Table IV. - Precambrian - Forest and Forest Tundra, 69,477 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	3.2	2.2
Est. Pop. index	225,315	152,849
% change from 1953		- 31.3%

Percent Species Composition-1954

Species	Percent	Species	Percent
Scaup	83.7	Pintail	.8
Mallard	6.0	Green-winged teal	.8
Baldpate	5.2	Golden-eye	.8
Bufflehead	2.7		

Table V. - Close Forest - 60° to 63° 30' N. Latitude, 41,465 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	2.8	3.6
Est. pop. index	116,433	149,276
% change from 1953		+ 28.6%
Canada geese per square mile	.28	.27
Est. pop. index	11,610	11,196
% change from 1953		- 3.6%

Table V (Continued)

<u>Percent Species Composition-1954</u>			
<u>Species</u>	<u>Percent</u>	<u>Species</u>	<u>Percent</u>
Scaup	40.5	Shoveler	1.7
Mallard	24.3	Bufflehead	1.7
Pintail	13.7	Canvasback	1.5
Baldpate	8.2	Ring-necked	1.2
Green-wing teal	6.2	Golden-eye	1.0

Table VI. - Precambrian Edge, Northwest Territories, 7,180 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	23.2	16.1
Est. pop. index	166,460	115,599
% change from 1953		- 30.6

<u>Percent Species Composition-1954</u>			
<u>Species</u>	<u>Percent</u>	<u>Species</u>	<u>Percent</u>
Scaup	57.7	Green-winged teal	4.6
Mallard	16.3	Pintail	3.0
Baldpate	8.0	Shoveler	.4
Ring-necked	5.2	Golden-eye	.1
Bufflehead	4.6	Canvasback	.1

Table VII. - Wooded MacKenzie Delta, 3,600 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	20.1	16.0
Est. pop. index	72,362	57,601
% change from 1953		-20.4
Swans per square	.08	.05
Est. pop. index	288	180
% change from 1953		37.5

Table VII (Continued)

<u>Percent Species Composition-1954</u>			
<u>Species</u>	<u>Percent</u>	<u>Species</u>	<u>Percent</u>
Scaup	48.9	Green-winged teal	2.3
Baldpate	20.0	Canvasback	1.8
Mallard	14.7	Bufflehead	0.6
Pintail	8.3	Shoveler	0.6
Golden-eye	2.6	Blue-winged teal	0.2

Table VIII. - Treeless MacKenzie Delta, 1,600 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	26	23.3
Est. pop. index	40,110	37,079
% change from 1953		- 10.4
White-fronted geese per square mile	.02	.24
Est. pop. index	32	384
% change from 1953		+1,100
Swans per square mile	1.1	1.2
Est. pop. index	1,760	1,920
% change from 1953		+ 9.9

<u>Percent Species Composition-1954</u>			
<u>Species</u>	<u>Percent</u>	<u>Species</u>	<u>Percent</u>
Pintail	75.8	Shoveler	1.0
Scaup	13.6	Green-winged teal	.4
Mallard	4.8	Golden-eye	.1
Baldpate	4.3		

Table IX. - Upland Tundra, Northwest Territories, 8,655 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	6.8	4.0
Est. pop. index	58,481	34,621
% change from 1953		- 41.2
White-fronted geese per square mile	.87	.59
Est. pop. index	7,530	5,106
% change from 1953		- 32.2
Canada geese per square mile	.08	.02
Est. pop. index	692	173
% change from 1953		- 84.0
Swans per square mile	.9	.8
Est. pop. index	7,789	6,924
% change from 1953		- 11.1

Percent Species Composition-1954

<u>Species</u>	<u>Percent</u>	<u>Species</u>	<u>Percent</u>
Scaup	58.2	Mallard	.9
Pintail	37.9	Green-winged teal	.5
Baldpate	2.5		

Table X. - Coastal Tundra, Northwest Territories, 900 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	2.9	1.8
Est. pop. index	2,610	1,620
% change from 1953		- 34.1
White-fronted geese per square mile	.67	1.3
Est. pop. index	603	1,170
% change from 1953		+ 94
Swans per square mile	1.8	1.0
Est. pop. index	1,620	900
% change from 1953		- 44.4



Percent Species Composition-1954

<u>Species</u>	<u>Percent</u>
Pintail	84.2
Scaup	12.3
Mallard	3.5

Table XI. - Forest Tundra North of 63° 30', 96,768 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	5.7	5.3
Est. pop. index	577,538	511,332
% change from 1953		- 7.0
Canada geese per square mile	.08	.08
Est. pop. index	7,741	7,741
% change from 1953		No Change
Swans per square mile	.1	.07
Est. pop. index	9,676	6,774
% change from 1953		- 30

Percent Species Composition-1954

<u>Species</u>	<u>Percent</u>	<u>Species</u>	<u>Percent</u>
Scaup	70.4	Green-winged teal	1.2
Pintail	11.2	Bufflehead	0.5
Baldpate	6.7	Canvasback	0.3
Mallard	6.1	Shoveler	0.3
Golden-eye	3.2	Ring-necked	0.1

Table XII. - Old Crow Flats, Yukon Territory, 1,970 Square Miles.

	<u>1953</u>	<u>1954</u>
Ducks per square mile	16.0	26.3
Est. pop. index	31,554	51,811
% change from 1953		+ 64.4
White-fronted geese per square mile	-	.05
Est. pop. index	-	99
Canada geese per square mile	.85	1.26
Est. pop. index	1,675	2,482
% change from 1953		+ 48.2
Swans per square mile		.12
Est. pop. index		236

Percent Species Composition-1954

<u>Species</u>	<u>Percent</u>	<u>Species</u>	<u>Percent</u>
Pintail	42.5	Mallard	2.9
Scaup	29.7	Golden-eye	1.9
Baldpate	13.5	Shoveler	1.5
Canvasback	6.6	Green-winged teal	1.4

Table XIII. - Brant and Goose Populations on the Deltas of the MacKenzie, Kugaluk, and Anderson Rivers and Cape Delhousie, N. W. T.

	<u>1953</u>	<u>1954</u>
Snow geese	8,580	7,189
Black brant	1,303	1,014
White-fronted geese	174	317
Canada geese	-	509

Production Indices

Table XIV. - A Summary of Production Data.

	Duck Broods Per Square Mile			Total Potential Broods	Average Size of Duck Broods 1954			Canada Goose Broods Per Square Mile	Swan Broods Per Square Mile
	1951	1952	1953	1954	Class C. I.	Class II.	Class III.	1954	1954
Close Forest	0.4	1.0	.36	.74	4.7	5.0	5.0	.02	-
Athabaska Delta	0.5	2.07	.31	8.06	-	6.7	-	-	-
Hay Lakes	0.7	3.53	2.22	4.15	5.2	4.0	-	-	-
Slave River	0.2	1.0	.29	.97	5.6	6.2	-	-	-
Precambrian	.07	0.33	.17	.39	6.3	4.6	5.0	-	-
Precambrian Edge	0.3	1.0	.49	1.61	4.9	5.8	-	.02	-
Forest Tundra	.13	.66	.35	.6	4.9	5.4	6.0	.05	.03
Wooded Delta	1.1	2.0	2.10	3.1	5.9	5.2	4.3	-	-
Treeless Delta	0.0	0.4	.11	1.22	-	-	4.0	-	-
Upland Tundra	.14	.15	.10	.37	3.0	-	4.0	-	.07
Coastal Tundra	0.0	0.9	.15	0.37	5.0	4.0	-	-	.36
Old Crow Flats	1.0	.73	1.14	1.83	5.0	5.9	6.0	.2	.05

Average Size Class I	Duck Broods (Based on 78 Broods)	5.5
Average Size Class II	Duck Broods (Based on 117 Broods)	5.3
Average Size Class III	Duck Broods (Based on 11 Broods)	4.8
Average Size Class II and III	Duck Broods (Based on 128 Broods)	5.3
Average Size Class I	Swan Broods (Based on 2 Broods)	3.5
Average Size Class II	Swan Broods (Based on 10 Broods)	3.4
Average Size Class II	Canada Goose Broods (Based on 8 Broods)	3.4

### Summary

Decreases were recorded in all areas with the exception of Old Crow, Slave River Parkland, and the Close Forest north to 63° 30'. Possibly, the extremely late season was responsible, at least in part, for these decreases. Of those areas that had an increase in population the latter two had much better surface water conditions than in 1953. The increase in the Old Crow Flats might possibly be explained by the fact that it lies in a sheltered basin completely surrounded by mountains, and as a consequence has a somewhat milder climate with an earlier break-up which would attract early migrants from the surrounding area.

The over-all duck population decreased 13.9 percent. The changes in the individual species are as follows:

Species	Percent	Species	Percent
Mallard	- 5.4	Green-winged teal	+144.2
Pintail	+ 2.3	Blue-winged teal	- 48.9
Baldpate	-20.3	Gadwall	- 0.8
Shoveler	-25.3	Scaup	- 22.1
Canvasback	- 3.5	Golden-eye	+ 75.5
Redhead	-32.8	Ruddy duck	- 11.6
Bufflehead	+ 6.6		

Of the above species the ruddy, blue-winged teal and gadwall occur in such small numbers that they are insignificant to the general waterfowl picture in the north.

All species of geese and whistling swans decreased as follows:

Canada geese	.9
White-fronted geese	15.1
Snow geese	16.2
Black brant	22.2
Swans	19.8

Production figures are comparable with 1951 and 1952 only. Compared with the latter year the 1954 survey indicates decreases in all areas except the Wooded Delta and the Old Crow Flats. The hatch of game ducks was late this season and, we feel, less than in 1953. Colonial nesting snow geese and black brant, although being late, had a good hatch, while the scattered Tundra nesters, swans, white fronts and lesser Canadas did poorly. Canada geese breeding in the timbered areas appeared to have been quite successful.

# WATERFOWL BREEDING GROUND STUDIES IN BRITISH COLUMBIA, 1954

D. G. Colls and R. H. Mackay

## Weather and Water Conditions

The winter of 1953-54 was characterized, in British Columbia, by fairly mild temperatures and excessive snowfall, particularly in the higher regions. Relatively low temperatures in spring and early summer delayed break-up for about three weeks.

The cool wet weather of the spring continued into mid-summer, and water levels in lakes and sloughs became noticeably higher than in 1953. However, water conditions were still considered most favorable for waterfowl production.

## Breeding Population Trends

The spring aerial survey of the Cariboo and Chilcotin areas, as in previous years, was made by running random transects. The size of the sample was increased by about 20 square miles in these areas this year. Comparable total waterfowl population figures were obtained in the spring aerial survey of the Upper Columbia Valley. The results of these aerial surveys, given in the following tables, indicated that the 1954 breeding population in the Cariboo and Chilcotin areas, was down about 18 percent from the 1953 population. The data from the Upper Columbia Valley indicated a 25 percent decline in the Canada goose population. They also suggested that the duck population had increased by about 33 percent from the 1953 figure; however, the aerial team felt this increase represented a concentration of birds caused by late break-up on higher and more northerly lakes and streams.

Table I. - Spring Aerial Survey - Cariboo and Chilcotin Areas.

	1950	1951	1952	1953	1954
Square miles samples	52.0	58.4	52.5	78.3	99.0
Ducks per square mile	13.2	16.6	11.4	12.5	10.2
Canada geese (total seen)	10	32	17	41	14

Table II. - Aerial Survey - Columbia Valley.

	1950	1951	1952	1953	1954
Ducks per square mile	19.9	10.1	12.0	19.5	26.2
Canada geese per square mile	20.1	17.4	19.7	25.3	19.0
Canada geese	1,612	1,395	1,575	2,025	1,528
Snow geese	-	-	-	-	12
Whistling swan	2	10	1	1	29
Mallard	773	402	445	576	309
Baldpate	167	83	155	103	115
Green-winged teal	24	-	15	-	2
Blue-winged teal	83	7	-	-	28
Canvasback	27	3	-	10	8
Scaup	18	9	53	3	143
Golden-eye	79	97	65	91	69
Bufflehead	2	21	9	18	75
Others	49	33	88	49	47
Unidentified	376	135	130	705	1,276
Total Ducks	1,598	790	960	1,555	2,101

The ground survey in the Cariboo Parklands was carried out during mid-May. The total number of ducks tallied was down about 11 percent from 1952 - the last year in which a ground count was made. Mallards were primarily responsible for this decrease. All other species appeared in about the same numbers as in 1952. The data obtained are shown in Table III.

Table III. - Comparative Counts - Cariboo Parklands - Spring.

Species	1946	1947	1949	1950	1951	1952	1954
Whistling swan	-	-	-	-	1	-	-
Canada goose	-	-	-	-	-	2	-
Mallard	39	35	10	35	61	107	43
Pintail	12	15	1	19	10	18	20
Baldpate	73	56	13	28	53	41	38
Gadwall	-	-	-	-	-	2	2
Green-winged teal	7	19	2	5	11	19	-
Blue-winged teal	-	-	-	-	31	12	2
Shoveler	5	9	2	5	12	15	12

Table III Continued

Species	1946	1947	1949	1950	1951	1952	1954
Redhead	12	36	32	32	37	32	30
Ring-necked duck	3	7	-	-	2	-	-
Canvasback	21	17	25	20	31	11	26
Lesser Scaup	403	467	155	476	241	205	247
Golden-eye	57	116	66	136	142	175	157
Bufflehead	79	100	30	117	89	95	72
Ruddy duck	31	42	26	59	92	91	92
Unidentified	-	-	-	-	-	11	-
Total ducks	742	901	364	932	812	834	741
Total Coots	447	167	35	170	154	107	201

Ground surveys of selected sample areas in the Okanagan Valley, made during mid-May, are recorded in Table IV.

Table IV. - Comparative Counts - Okanagan Valley - Spring.

Species	1950	1951	1952	1954
Mallard	45	27	12	15
Pintail	9	1	-	-
Baldpate	6	6	3	11
Gadwall	18	10	13	-
Green-winged teal	3	-	4	-
Blue-winged teal	22	3	2	-
Redhead	86	150	67	90
Lesser Scaup	49	12	7	50
Golden-eye	4	-	2	11
Bufflehead	6	-	1	10
Others	76	19	40	43
Total Ducks	270	179	151	230
Total Coots	157	70	69	453

The data indicate a substantial increase in the breeding population in the Okanagan region since 1952. It is considered that the increase resulted from the late break-up further north, and that the decrease noted in the Cariboo was caused by the same factor.

Data gathered on the ground survey of the Upper Columbia Valley in early June are contained in the following table.

Table V. - Comparative Counts - Upper Columbia Valley - Spring.

Species	1948	1949	1950	1951	1952	1954
Canada goose (nests)	23	17	20	22	18	4
Mallard	172	87	94	85	62	6
Pintail	1	3	2	5	2	-
Baldpate	13	9	6	8	9	6
Green-winged teal	-	4	1	4	2	1
Blue-winged teal	4	21	5	6	2	-
Cinnamon teal	2	2	2	-	-	1
Shoveler	-	-	2	2	3	-
Wood duck	-	-	4	4	-	-
Redhead	-	-	2	12	18	7
Ring-necked	13	2	3	1	6	2
Lesser Scaup	-	-	3	13	5	12
Golden-eye	73	19	47	42	35	26
Bufflehead	19	14	18	16	8	10
Ruddy	-	-	-	1	9	-
Hooded merganser	-	-	3	7	-	4
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Total Ducks	297	161	192	206	154	75
Total Coots	84	45	30	50	20	34

The above data suggest that there was a drastic reduction in the breeding population since 1952. It was felt, however, that this was not the case. Water levels had risen some eight feet during May, and the whole valley floor was covered with water. Sloughs and channels were continuous, and it was possible to travel anywhere by canoe, subject only to the barriers of dense vegetation. It was felt that this flooding resulted in considerable dispersion of birds, thereby reducing the number on any one of our check areas.

Examination of breeding population data from all sample areas in the province, suggested that there had been a decrease of about 9 percent in the number of breeding ducks in British Columbia this year as compared with 1952. Mallards appeared in about one-third of their 1952 numbers. Pintail, Baldpate, and Shoveler held their own, while most of the diving ducks stayed at about their 1952 population level or showed a noticeable increase. The coot was observed in greater numbers than ever recorded on the check areas.



Considering the limits of reliability of the census methods, the late spring, and the apparent hold-back of population in the more southerly regions, it was felt that British Columbia's 1954 breeding waterfowl population was as good as that of 1952 and 1953.

### Production

Broods started to appear at the end of June, but not in substantial or significant numbers. By mid-July they were appearing steadily, but still not in substantial numbers. Broods were beginning to appear in more normal numbers by early August.

Mid-summer brood counts were made in the Okanagan, Kamloops and Cariboo regions. The data from check areas in the Cariboo are summarized in Table VI.

Table VI. - Mid-Summer Counts, Cariboo Parklands.

	1951		1952		1953*		1954*	
	Adult	Young	Adult	Young	Adult	Young	Adult	Young
Mallard	57	50	129	24	3	17	15	25
Pintail	1	-	10	9	2	4	1	-
Baldpate	63	67	28	64	11	53	11	33
Gadwall	2	16	1	-	1	8	-	-
Green-winged teal	14	37	28	32	4	30	14	16
Blue-winged teal	6	9	4	14	6	7	27	-
Shoveler	1	5	7	21	4	11	-	-
Redhead	21	67	10	72	12	69	13	41
Canvasback	9	22	35	27	8	37	9	12
Lesser scaup	174	293	212	257	138	87	298	43
Golden-eye	216	306	239	110	55	168	63	141
Bufflehead	42	36	110	68	27	99	43	66
Ruddy duck	36	16	89	19	65	19	56	25
Unidentified	-	-	102	7	-	-	108	-
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Total	642	924	1,004	724	336	609	658	402
American Coot	369		283		310		205	

\* 1953 and 1954 counts made three weeks earlier than previous years -- not strictly comparable.

The Cariboo count was made on the same calendar date as in 1953. Phenologically, however, this count is at least three weeks earlier than that of 1953. Total counts of adults and young were up and down respectively from 1953. Flocks of drake scaup ducks accounted for the increase in adults, while the lateness of the hatch was believed to explain the decrease in young.

Brood counts from the Okanagan and Kamloops areas could not be compared directly with data from previous years. The 1954 data suggested that the hatch had been considerably delayed, with a few early broods just then reaching the flying stage, and a second or later, hatch just beginning. The Class III brood average appeared about normal, while the Class I average appeared to be lower than normal.

A summary of the brood data, from all areas, is shown in Table VII. The figures for 1953 and 1954 are again not strictly comparable with those of previous years, as these two counts were completed earlier than in the past.

Table VII. - Summary of Brood Data. \*

	1950	1951	1952	1953	1954
Mallard	7.5 ( 50)	6.3 ( 37)	4.9 ( 11)	6.4 ( 12)	5.6 ( 32)
Gadwall	5.0 ( 1)	6.0 ( 8)	7.0 ( 3)	8.0 ( 1)	6.0 ( 3)
Pintail	6.3 ( 22)	4.8 ( 9)	5.0 ( 3)	6.0 ( 3)	5.5 ( 18)
G-w. teal	8.6 ( 8)	7.0 ( 7)	5.3 ( 6)	7.5 ( 4)	8.0 ( 2)
B-w. teal	7.9 ( 20)	7.8 ( 6)	7.0 ( 2)	7.0 ( 1)	5.0 ( 3)
Baldpate	7.6 ( 31)	5.9 ( 28)	6.2 ( 14)	6.6 ( 15)	6.3 ( 11)
Shoveler	6.1 ( 7)	6.4 ( 8)	6.3 ( 3)	3.7 ( 3)	6.5 ( 6)
<hr/>					
Total Pond Ducks	7.3 (139)	6.1 (103)	6.0 ( 42)	6.4 ( 39)	5.8 ( 75)
Redhead	5.7 ( 17)	6.7 ( 22)	7.5 ( 13)	6.2 ( 12)	5.5 ( 19)
Canvasback	8.7 ( 4)	8.4 ( 10)	6.2 ( 6)	5.7 ( 14)	4.7 ( 3)
Lesser Scaup	8.3 ( 35)	7.7 ( 59)	7.5 ( 41)	8.2 ( 13)	7.3 ( 7)
B. golden-eye	6.5 ( 87)	6.0 ( 28)	4.8 ( 11)	6.0 ( 43)	6.5 ( 43)
Bufflehead	6.6 ( 27)	5.6 ( 6)	4.7 ( 3)	6.0 ( 22)	5.9 ( 14)
Ruddy duck	5.7 ( 30)	6.2 ( 17)	4.3 ( 9)	5.7 ( 4)	5.6 ( 8)
<hr/>					
Total Diving Ducks	6.6 (200)	7.0 (142)	5.8 ( 83)	6.4 (108)	6.1 ( 94)

\* Bracketed figures refer to numbers of broods averaged.

### Summary

1. Weather conditions were responsible for a delay of at least three weeks in waterfowl production in British Columbia this year.

2. Water levels, following the delayed break-up were higher this year than in 1953, but were considered favorable for waterfowl production.

3. Spring aerial and ground waterfowl surveys comparable with those made in previous years suggested that the breeding population was down by about 9 percent from 1953. In view of the delayed spring, the limits of reliability of techniques, and the population hold-back in southerly areas, it was felt that the 1954 population was not significantly different from that of 1952 and 1953.

4. The mid-summer brood counts suggested that the 1954 hatch had been considerably delayed, with a few early broods just reaching flying stage at the time of census, and a later, possibly second, hatch just beginning.

5. The indications were that the 1954 hatch would be as good as that of 1953, although somewhat delayed.

## AERIAL WATERFOWL BREEDING GROUND SURVEY IN ALBERTA - 1954

Allan G. Smith and G. Hortin Jensen

### Introduction

The 1954 Alberta waterfowl survey was conducted with the following objectives in mind: (1) to supply the Waterfowl Regulations Committee of Canada and the United States with forecasts of the production and fall flights of waterfowl; (2) through intensive ground surveys to provide basic ecological information for better interpretation of data obtained from extensive aerial surveys, and to provide a better understanding of the mechanics of producing waterfowl; and (3) to band a representative sample of young waterfowl prior to the opening of the waterfowl season for the purpose of obtaining information on hunting pressures, mortality rates, and distribution.

Aerial breeding pair and brood surveys were flown with a Cessna 170, piloted by G. H. Jensen, with Allen G. Smith acting as observer. Clinton Lostetter, U. S. Fish and Wildlife Service, participated in both aerial and ground phases of the waterfowl survey in the month of May. Ground studies as well as comparative air-ground breeding pair and brood surveys were conducted on the same four intensive study areas that were set up in 1953. The personnel and areas involved are listed below:

- Area 1 - (Brooks-Suffield) - Mr. Fred Sharp, Ducks Unlimited (Canada)
- Area 2 - (Strathmore) - Mr. George Freeman, Ducks Unlimited (Canada)
- Area 3 - (Lousana) - Messrs. Wayne H. Heuer, U. S. Fish and Wildlife Service and Dennis Weisser, Alberta Game Branch.
- Area 4 - (Vermilion) - Messrs. Harry Webster and David Hurst, Canadian Wildlife Service.

Two banding crews were organized in July and were composed of the following men: Messrs. Kenard Baer, James Birch, Clinton Lostetter, U. S. Fish and Wildlife Service, Harold Boeker, Willis Mansfield, Colorado Game and Fish Commission, Monte Dodson, Oklahoma Game and Fish Commission and George Wrakestraw, Wyoming Game and Fish Commission. Banding was also carried on by the crews of Areas 3 and 4.

### Survey Methods

Breeding pair and production indices were obtained for the province of Alberta by means of aerial surveys. Methods of observation were the same as outlined in Waterfowl Populations and Breeding Conditions, Summer 1952; Special Scientific Report: Wildlife No. 21, with the exception that a dictaphone was utilized for recording transect data 'in flight.' This has served one very useful purpose, the further refining of our population and production indices. It became possible to identify and record all of the minor species which in other years were relegated to a miscellaneous category, because of the time element involved in making the observation and writing them on an appropriate form.

To further simplify and standarize the transect data for all provinces, all transects were flown and data recorded by intervals of 18 linear miles each.

The number and location of all aerial transects in all strata was identical in 1952, 1953 and 1954.

#### Weather and Water Conditions

The 1954 waterfowl breeding season in Alberta was delayed about two weeks by a period of unseasonably low temperatures accompanied by snow between April 19 and May 2. Heavy snows in the parklands and northern prairies left all but the extreme eastern and southern areas in good condition as far as water was concerned. A compilation of precipitation reports by the Searle Grain Company showed Alberta's general moisture condition to be 90 percent of normal on May 5. Light snows and rains in the south (Strata C) made this area relatively poor breeding habitat in May. General heavy rains in central and northern areas in May and June improved the over-all moisture condition to 106 percent of normal by June 15. At this time, however, the extreme south continued to dry out. From mid-June until July 27, the general moisture condition of the province deteriorated further to a point 86 percent of normal. By August 10 this had risen again to 95 percent. Nevertheless, southern areas never did recover their early water losses during the period of this survey as Table I illustrates below.

Table I. - Water Areas on Aerial Transects, May and July, 1954.

	<u>Strata A</u>		<u>Strata B</u>		<u>Strata C</u>		<u>Province</u>	
	<u>May</u>	<u>July</u>	<u>May</u>	<u>July</u>	<u>May</u>	<u>July</u>	<u>May</u>	<u>July</u>
Total Ponds Seen	5169	2872	4392	2895	615	329	10176	6096
Ponds per Sq. Mi.	19.62	10.91	23.24	15.69	7.59	3.85	18.07	11.43
Loss or Gain		-44.4%		-32.5%		-49.2%		-36.7%

An experimental running of a second brood survey from July 26 to August 2 illustrated the rapidity of the disappearance of water areas in late summer. Further losses occurred in all strata with the result that total water loss from May to August was 60.8 percent in Stratum A, 44.9 percent in Stratum B, 62.3 percent in Stratum C and an average provincial loss of 58.2 percent. Prior to this year, we have little accurate data on this late summer loss, therefore, no comparable figures are available for other years.

### Breeding Population Trends

Comparisons of breeding populations of 1953 and 1954 are given in Table II. Various yearly comparisons by strata and province are given along with percent of change from last year.

Stratum C shows a decrease of 34 percent from last year but is only low by 4 percent from the long-time average. This decrease in stratum C to lower than normal populations can be traced to poorer water conditions over last year with reductions in breeding populations in nearly all species of puddle ducks. Pintails showed the greatest loss followed by baldpates and mallards. Diving ducks were more static. Losses in redheads were balanced by gains in canvasback and scaup with the over-all diving duck population index showing a loss of 2 percent.

Table II. - Comparison of Aerial Waterfowl Population Indices, 1953 - 1954.

	Strata A		Strata B		Strata C		Province	
	1953	1954	1953	1954	1953	1954	1953	1954
Total Area	:	:	:	:	:	:	:	:
Square Miles:	22088	22088	26100	26100	16112	16112	64300	64300
Sample Area	:	:	:	:	:	:	:	:
Square Miles:	489.7	526.5	365.2	378.0	157.7	162.0	1012.6	1066.5
Total Ducks	25306	28518	11994	14966	4848	3278	40148	46562
Total Ducks	:	:	:	:	:	:	:	:
Per Sq. Mi.	46.58	54.16	32.84	39.59	30.74	20.23	37.36	39.59
Total Pairs	11653	14259	5997	7483	2424	1639	20074	23381
Total Pairs	:	:	:	:	:	:	:	:
Per Sq. Mi.	23.79	27.08	16.42	19.79	15.37	10.11	18.68	19.87
Pop. Index	:	:	:	:	:	:	:	:
in Ducks	1050986	1196402	857176	1033366	495280	326020	2403388	2555788
Pop. Index	:	:	:	:	:	:	:	:
in Pairs	525493	598201	428588	516683	247640	163010	1201694	1277894
Percent	:	:	:	:	:	:	:	:
Change	:	↑ 14	:	↑ 21	:	- 34	:	↑ 6

Stratum A shows an over-all 14 percent gain in breeding populations for 1954 when compared with last year. Mallards have shown a considerable increase (11 percent) in this stratum this season. It is also significant to note that this increase can further be traced to minor species of puddle ducks and all species of diving ducks. This stratum, usually the stronghold of the pintail, shows a decrease in pintails and also baldpates from the 1953 season.

Stratum B shows an increase in both puddle and diving ducks with an over-all increase of breeding indices of 21 percent. Two species, pintails and ruddies, failed to show increases over last year and the mallard, the principal species of the stratum, showed only a slight gain, 4 percent. Rather substantial gains were noted by minor species of puddle ducks, and all species of diving ducks, except ruddies.

By way of explanation of the increases in all minor species, we believe that a certain portion of these increases can be ascribed to the use of the dictaphone. By use of the dictaphone, we were able to record more data on species composition. Thus, and probably rightly so, more of the unidentified segment has been prorated to the lesser species. This ability to record data on minor species has caused larger increases where, with small numbers involved, changes can be great. To some extent this will account for part of the great increases in minor species.

Table III. - Species Composition of Breeding Population - Aerial.

Species	1953		1954	
	Prs. /Sq. Mi.	% of Tot. Pop.	Prs. /Sq. Mi.	% of Tot. Pop.
Mallard	7.0	37.6	7.1	35.8
Pintail	6.7	36.0	5.5	27.8
B-w. teal	0.5	2.7	1.3	6.4
G-w. teal	0.07	0.4	0.6	2.3
Gadwall	0.1	0.5	0.4	1.9
Baldpate	1.3	7.0	1.3	6.5
Shoveler	1.2	6.5	1.3	6.5
Redhead	0.3	1.6	0.3	1.7
Canvasback	0.3	1.6	0.4	2.0
Scaup	0.95	5.1	1.5	7.4
Ruddy	0.1	0.5	0.1	0.5
Bufflehead	0.08	0.4	0.1	0.6
Goldeneye	0.08	0.4	0.1	0.6
Cinn. teal	0.01	0.1	trace	trace
Total	18.6	100.0	19.87	100.0

#### Success of the Season

Each year since the drought of 1949 and 1950, waterfowl breeding populations in Alberta have continued to increase. Production of broods has lagged occasionally during this period because of adverse weather factors, but general conditions in the summer of 1954 were such as to foster an appreciable increase in over-all production. (See Table IV.)

Table IV. - Aerial Production Data - 1953 - 1954.

	Strata A		Strata B		Strata C		Province	
	1953	1954	1953	1954	1953	1954	1953	1954
Area	:	:	:	:	:	:	:	:
Sq. Mi.	22088	22088	26100	26100	16112	16112	64300	64300
Sample	:	:	:	:	:	:	:	:
Sq. Mi.	244.85	263.25	177.575	184.5	78.85	85.5	501.275	533.25
Tot. Broods:	:	:	:	:	:	:	:	:
Seen	763	1349	514	605	100	96	1377	2050
Brds/Sq. Mi:	:	:	:	:	:	:	:	:
Seen	3.12	5.12	2.89	3.28	1.26	1.12	2.74	3.37
Est. No.	:	:	:	:	:	:	:	:
Brds Seen	68915	113091	75429	85608	20301	18045	164645	216744
Pot. later	:	:	:	:	:	:	:	:
Brds.*	332	214	74	172	126	41	532	427
Pot. Brds/	:	:	:	:	:	:	:	:
Sq. Mi.	1.35	0.81	0.41	0.93	1.61	0.48	1.14	0.78
Pot. later	:	:	:	:	:	:	:	:
Brds.	29818	17891	10701	24273	25939	7734	66458	49818
Tot. Ind.	:	:	:	:	:	:	:	:
Brds.	1095	1563	588	777	226	137	1909	2477
Brds/Sq.	:	:	:	:	:	:	:	:
Mi. Ind.	4.47	5.93	3.30	4.21	2.87	1.60	3.88	4.15
Est. No.	:	:	:	:	:	:	:	:
Brds. Ind.	98733	130982	86130	109881	46240	25779	230782	266642
Aver. Brd.	:	:	:	:	:	:	:	:
Size	5.47	5.59	5.71	5.78	4.80	5.25	5.51	5.64
Est. No.	:	:	:	:	:	:	:	:
Young	540070	732189	491812	634912	221957	135340	1252293	1503861

\* Potential later broods. This figure is derived by tallying the pairs, lone males and lone females present on the transect in July. For the purpose of comparison with 1953 figures we assume that each pair, male or female represents a potential brood and that it will hatch. As this is impossible, we know that this is an inflated figure. In a year such as this, however, we may estimate that between 60 and 75 percent would be successful.

The delayed nesting season, good water conditions (except in Stratum C) and a large breeding population have all combined to make 1954 a 'first hatch' year in Alberta. Beginning June 1, the prairie hatch was sudden and spectacular and by June 15 the hatch was general throughout the parklands. By mid-July, during the brood survey, about 90 percent of all broods observed were of either Class II or III size. The remaining 10 percent were primarily Class I broods of blue-winged teal, scaup and other late nesting species. Brood sizes were somewhat smaller than the long-time average in all strata but an increase in numbers of broods raised the brood index 12 percent above the average and 11 percent above 1953.



In Stratum C, the average number of ducklings per brood was the smallest (5.25), in Stratum B the highest (5.78). The provincial average of 5.64 young per brood did not vary in the least even when a second aerial brood survey was made in late July and early August.

The drought conditions in Stratum C were reflected throughout the season, causing a 34 percent reduction in breeding populations and an 11 percent loss in production. As 1953 was also a relatively poor year in this stratum, a more accurate picture of conditions in this southern prairie is apparent when we consider that the 1954 production was 67 percent below the average. In May there were 15 percent less water areas in this stratum than in 1953. By late July, 62 percent of these areas had dried up.

In Stratum A, a population increase of 14 percent over 1953 was recorded, while the production index rose 64 percent over that of the previous season. In perspective, the population was 56 percent above average and the production about 7 percent above average. The hatch here might have been even greater had it not been for the drought effects in the southern districts of this stratum where it was influenced by conditions to the south. Nevertheless, both population and production indices were the highest recorded since our surveys began in 1947.

In general, water conditions were excellent in Stratum B, where populations were 21 percent above those the previous year and 54 percent above the average. The production index rose 22 percent above 1953 and 44 percent above the average. At the start of the season there were about 13 percent more water areas in this stratum than in 1953 and by August 1 only 45 percent of these had dried up.

Aside from the drought in the south, the only other serious weather factor to influence production in Alberta after May 1 were a series of wide-spread hailstorms in July. Unlike those in 1953, these caused relatively minor damage to ducks because of the soft, mushy nature of most of the hail stones. Agricultural losses were high, however, because of the weight of hail on young grain. One aerial transect flown for the entire length of the path of the most destructive hail storm of the summer showed no evidence that it had affected even the youngest Class I broods. Wind velocities, as well as the size and harness of the hail stones are of paramount importance in considering hail damage to waterfowl. In 1954, despite large agricultural losses, relatively light hail damage was suffered by waterfowl.

In the parklands, heavy nest losses by avian predators were noted by our ground study crews. This was apparently caused by the sparse nature of the new vegetative growth during the nesting season. Delayed by the snows and severe temperatures of late April and early May, even the aspen were not fully leaved until June 15. Crows and magpies nested at their regular time but waterfowl were delayed by the inclement weather. This placed the ducks at a decided disadvantage during May and early June as nesting cover was decidedly poor until the period when parkland duck broods were hatching. In spite of this condition, aerial observations recorded a potential later hatch of slightly less than one brood per square mile. As this is considered about average, nest losses, though primarily attributed to avian predators were not overly high because of a minimum loss through agricultural practices.

### Summary

The waterfowl breeding population and production indices for the province of Alberta were higher in 1954 than in any year since our cooperative surveys began in 1947. Drought conditions in the southern prairies (Stratum C) and relatively high nest losses in the parklands due to avian predation were not great enough to cut waterfowl production below the long-time average. A slight reduction in average brood size was offset by a sizeable increase in total broods. A late spring and resulting late nesting combined with favorable weather conditions made 1954 a very successful waterfowl breeding season on the western prairies and parklands of Canada.

### Banding

During July and early August two banding crews led by Messrs. Kenard Baer and James Birch, U. S. Fish and Wildlife, operated in the prairies and parklands of Alberta. Though occasionally acting as separate units, they found that far greater success could be attained by combining their man power and working as a unit. One banding operation on Area III was carried out with the cooperation of the ground crew assigned to that area, and another of like nature utilized the crew working on Area IV. Messrs. Harry Webster and David Hurst, Canadian Wildlife Service, acting as a separate crew banded 326 waterfowl on Area IV and surrounding districts. These records have been added to the grand totals in Table V as were the approximately 400 bandings on Area III.

Table V. - Summary of Waterfowl Bandings in Alberta - 1954.

Species	Adults				Juveniles				Total
	♂	♀	Un-Sexed	Total	♂	♀	Un-Sexed	Total	
Mallard	13	15	-	28	484	530	-	1014	1042
Pintail	15	11	-	26	726	765	-	1491	1517
Gadwall	-	-	-	-	25	27	-	52	52
Baldpate	1	-	-	1	134	123	-	257	258
B-w. teal	506	70	-	576	277	319	-	596	1172
G-w. teal	43	10	-	53	31	50	-	81	134
Shoveler	-	1	-	1	313	376	-	689	690
Rehead	-	1	-	1	7	5	-	12	13
Canvasback	-	1	-	1	9	8	-	17	18
Scaup	2	3	-	5	12	10	-	22	27
Bufflehead	-	-	-	-	3	-	-	3	3
Ww. Scoter	-	-	-	-	2	9	-	11	11
Ruddy	1	-	-	1	-	-	-	-	1
Coot	-	-	23	23	-	-	8	8	31
Eared Grebe	-	-	2	2	-	-	2	2	4
Grand Totals	581	112	25	718	2023	2222	10	4255	4973



# WATERFOWL BREEDING GROUND SURVEYS OF SPECIAL STUDY

## AREAS IN ALBERTA, 1954

Allan G. Smith and Harry R. Webster

### Introduction

The intensive ground study areas in Alberta were established with the following objectives in mind: (1) to determine the accuracy with which the contribution of ducks from specific study areas to the fall flight can be forecast on June 15 and August 1, and (2) to determine the relative importance, or relationship, of the various factors such as breeding population, broods, water, etc., to the fall flight.

### Description of the Areas

A general description of the study areas including their soil characteristics and vegetative aspects was presented in Waterfowl Populations and Breeding Conditions, Summer 1952, Special Scientific Report: Wildlife No. 21, and will not be repeated here.

### Methods and Personnel

The four study areas established in 1953 were the subject of further study this year. The areas and biologists assigned to each are listed below:

- Area 1 - Brooks-Suffield - Mr. Fred Sharp, Ducks Unlimited (Canada)
- Area 2 - Calgary-Strathmore - Mr. George Freeman, Ducks Unlimited (Canada)
- Area 3 - Lousana-Elnora - Messrs. Wayne H. Heuer, U. S. Fish and Wildlife Service, and Dennis Weisser, Alberta Game Branch
- Area 4 - Vermilion - Messrs. Harry Webster and David Hurst, Canadian Wildlife Service

Aerial surveys of all study areas were made by G. H. Jensen and Allen G. Smith.

The data contained in this report are a compilation of the work of the men listed above. Without their services little ground data would have been gathered. The biologists working on Areas III and IV were resident on the areas in question, while the biologists working on Areas I and II made periodic visits to the areas as necessary for gathering breeding pair, brood and nest information.

The methods of conducting the study this year were identical with those described in the report of Waterfowl Populations and Breeding Conditions, Summer 1953, Special Scientific Report: Wildlife No. 25.

### Weather and Water Conditions

The waterfowl breeding season in 1953 ended with water areas generally at the May levels. By mid-August the rains tapered off, and following a dry fall and winter, March brought some excesses in snowfall. Mid-April saw the beginning of a record-breaking period of below freezing temperatures and considerable snow. This cold and stormy period did not break until early May at which time snow lay 14 inches deep on Area III and from 4 to 6 inches on Areas I, II and IV. Water areas were frozen and as the waterfowl migration had begun prior to this spring storm, open areas on streams and lakes were at a premium. By May 1, no ducks had arrived in the Kneehills District of Area III due to the heavy snow cover, and parkland nesting was delayed about two weeks longer than on the prairies, where this same storm had caused a two week set-back in the season.

Water levels on Area IV (northern parklands) were slightly above and on Area II (northern prairies) were about the same as in 1953. However, on Area III (southern parklands) they averaged six inches higher and on Area I (southern prairies) six inches lower than in the previous season. Reduction of water levels on Area I were sufficient to cause a loss of 50% of the water areas present the year before. Heavy rains in the Area III district spread a great deal of sheet water over the more level terrain and contributed to the very late plowing characteristic of this region.

By August 4 only twelve ponds remained on Area I where 30 were found in May, 1954, and 62 in May, 1953. All water gauges were dry by June 3 and by way of further explanation, the 12 areas still present by August 4 were primarily the result of irrigation run-off and are very temporary in nature. For all practical purposes of providing breeding and brooding habitat, Area I nearly dried up by mid-June. As irrigation water was turned into the Brooks-Tilley district in June, sufficient spillage and sump areas were created to care for the limited brood production there, but from Tilley to Suffield a non-irrigated area, available water of a permanent nature could be found only by broods traveling overland at least a mile from the study area.

The remaining study areas suffered water losses as well as gains with highest levels occurring during the June rains. By the end of the season, however, water levels on Area II averaged 10 inches below those in May, on Area III 7.5 inches below those in May and Area IV three inches below those at the start of the season. The latter area is located on the northeastern edge of the parklands where by late summer the effects of the near drought in eastern Alberta was being felt. Ninety-five water areas dried up between mid-May and August 1, a loss of 44.4 percent of those available at the beginning of the season.

Table I. - Pothole Survival.

Study Area	May	June	July	August
I	30	23	18	12
II	61	63	53	40
III	191	191	186	163
IV	196	202	188	109

### Breeding Populations

At least two breeding pair counts (beat-outs) were made on each study area, one in mid-May and one in June. In former years our first breeding pair count was usually made early in May. Because of the severe cold of late April and early May, populations had not settled down sufficiently to make accurate counts in Alberta until mid-May in 1954. The two weeks delay in the start of the breeding season, followed by generally favorable weather conditions and reduced agricultural activity caused the season to progress in a regular pattern throughout the balance of the summer.

Populations on the prairie study areas did not vary appreciably from those recorded in 1953. The indicated population in ducks per square mile on Area I was 4.3 percent last year, on Area II 1.9 percent above 1953. In Area III, the southern parklands, the 1954 breeding population rose 36.6 percent above the previous year to reach 135 pairs per square mile. This is by no means a restricted area of high population but a truly representative sample of a large area of Alberta's south-western parklands. Area IV, in the northeastern parklands, tallied a loss of 6.2 percent in breeding populations. Because of the relatively slight loss or gain in all study areas except the Lousana Area, no appreciable change is considered to have occurred on three of the four districts.

Tables II and III below record population changes in May and June of 1954, a comparison of the breeding populations in May of 1953 and 1954 and the species composition of all study areas in 1954.

Table II. - Breeding Populations - All Study Areas.

Area I (4.875 sq. mi.)								
	:Total:	:Lone	:Lone	:Ind.:	:Ducks/	:Pairs/	:Ind. Pop./	:
Date	:Ducks:	:Pairs:	:Males:	:Females:	Pop.:	Sq.Mi.:	Sq.Mi.:	Ducks Sq.Mi.:
May 1954	: 300 :	: 101 :	: 98 :	: 0 :	: 398 :	: 61.5 :	: 40.8 :	: 81.6 :
June 1954	: 157 :	: 38 :	: 78 :	: 3 :	: 238 :	: 32.2 :	: 24.4 :	: 48.8 :
May 1953	: 306 :	: 98 :	: 110 :	: 0 :	: 416 :	: 62.8 :	: 42.7 :	: 85.3 :

Area II (3.125 sq. mi.)								
	:Total:	:Lone	:Lone	:Ind.:	:Ducks/	:Pairs/	:Ind. Pop./	:
Date	:Ducks:	:Pairs:	:Males:	:Females:	Pop.:	Sq.Mi.:	Sq.Mi.:	Ducks Sq.Mi.:
May 1954	: 439 :	: 120 :	: 199 :	: 0 :	: 638 :	: 140.5 :	: 102.0 :	: 204.1 :
June 1954	: 331 :	: 81 :	: 169 :	: 0 :	: 500 :	: 105.9 :	: 80.0 :	: 160.0 :
May 1953	: 423 :	: 110 :	: 203 :	: 0 :	: 626 :	: 135.4 :	: 100.2 :	: 200.3 :

Area III (3.625 sq. mi.)								
	:Total:	:Lone	:Lone	:Ind.:	:Ducks/	:Pairs/	:Ind. Pop./	:
Date	:Ducks:	:Pairs:	:Males:	:Females:	Pop.:	Sq. Mi.:	Sq.Mi.:	Ducks Sq.Mi.:
May 1954	: 811 :	: 322 :	: 154 :	: 13 :	: 978 :	: 223.7 :	: 134.9 :	: 269.8 :
June 1954	: 753 :	: 266 :	: 210 :	: 11 :	: 974 :	: 207.7 :	: 134.3 :	: 268.7 :
May 1953	: 578 :	: 220 :	: 125 :	: 13 :	: 716 :	: 159.4 :	: 98.8 :	: 197.5 :

Area IV (6.375 sq. mi.)								
	:Total:	:Lone	:Lone	:Ind.:	:Ducks/	:Pairs/	:Ind. Pop./	:
Date	:Ducks:	:Pairs:	:Males:	:Females:	Pop.:	Sq.Mi.:	Sq.Mi.:	Ducks Sq.Mi.:
May 1954	: 766 :	: 296 :	: 165 :	: 9 :	: 940 :	: 120.2 :	: 73.7 :	: 147.5 :
June 1954	: 625 :	: 198 :	: 207 :	: 22 :	: 854 :	: 98.0 :	: 67.0 :	: 134.0 :
May 1953	: 797 :	: 296 :	: 192 :	: 13 :	: 1002 :	: 125.0 :	: 78.6 :	: 157.2 :

Table III. - Species Composition of Breeding Population - All Study Areas.

Species	Area I			Area II			Area III			Area IV		
	Total Pairs	Prs. Sq. Mi.	Per % Sp. Comp.	Total Pairs	Prs. Sq. Mi.	Per % Sp. Comp.	Total Pairs	Prs. Sq. Mi.	Per % Sp. Comp.	Total Pairs	Prs. Sq. Mi.	Per % Sp. Comp.
Mallard	41	8.4	20.6	56	17.9	17.6	151	41.7	30.9	169	26.5	35.9
Pintail	83	17.0	41.7	133	42.6	41.7	20	5.5	4.1	41	6.4	8.7
Gadwall	5	1.0	2.5	4	1.3	1.2	8	2.2	1.6	8	1.2	1.7
Baldpate	10	2.1	5.0	19	6.1	6.0	30	8.3	6.1	50	7.8	10.6
G-w. teal	2	0.4	1.0	-	-	-	18	5.0	3.7	30	4.7	6.4
B-w. teal	18	3.7	9.0	30	9.6	9.4	117	32.3	23.9	103	16.2	21.9
Cinn. teal	-	-	-	-	-	-	1	0.3	0.2	0	0.0	0.0
Shoveler	40	8.2	20.1	40	12.8	12.5	9	2.5	1.8	14	2.2	3.0
Redhead	-	-	-	2	0.6	0.6	8	2.2	1.6	4	0.6	0.9
Canvasback	-	-	-	14	4.5	4.4	21	5.8	4.3	15	2.4	3.2
Scaup	-	-	-	19	6.1	6.0	73	20.1	14.9	30	4.7	6.4
Golden-eye	-	-	-	-	-	-	1	0.3	0.2	1	0.2	0.2
Bufflehead	-	-	-	-	-	-	18	4.9	3.7	3	0.5	0.6
Ruddy	-	-	-	1	0.3	0.3	13	3.6	2.7	2	0.3	0.4
Ringed-neck	-	-	-	-	-	-	1	0.3	0.2	0	0.0	0.0
Unidentified	-	-	-	1	0.3	0.3	-	-	-	-	-	-
Totals	199	40.8	100.0	319	102.0	100.0	489	134.9	100.0	470	73.7	100.0

### Nesting

Forty active nests were located on Area II, 15 of which were mallards, 21 pintails. Nest success was relatively high, 62.5 percent. Crow predation accounted for 60 percent of the unsuccessful nests.

One hundred and six active nests were located on Area III, approximate half (52) of which were mallard nests. Average nest success was very low (31 percent) due to an excessive amount of avian predation. Both crows and magpies accounted for the destruction of a greater number of waterfowl nests in the parklands this year because of the scarcity of good nesting cover until after June 15. The very late spring held back all vegetation. Even the aspens were not fully leaved until June 15 in the southwestern parklands. In cases where predation was definitely established, 33 percent was attributed to crows and magpies, 16 percent to coyotes and/or ground squirrels. In most of the questionable cases, eggs were completely removed from the nest without any observable disturbance to or around the nest. Because of the relative frequency with which scattered eggs were found throughout the area which had been destroyed by crows and magpies, it is assumed that the bulk of the nests destroyed by 'unknown causes' could be attributed to these avian predators. Aside from the 106 active nests located, 83 nests were found which had already been destroyed when located. These were not considered in securing nest success figures.

Eighty-one active nests were located on Area IV, one-half of which were mallards. Nest success was lower here than on any of the other study areas, 27.9 percent. Avian predators accounted for 40 percent of nests lost, mammalian predators 14 percent, 21 percent were lost to unknown causes, 19 percent were deserted and 6 percent were lost by flooding. Four of the deserted nests were believed to have been abandoned because of the extreme weather in late April and early May. In this area, also, many of the losses by 'unknown causes' were probably the result of avian predation.

### Production

At least two brood counts of the 'beat-out' variety were made on each area from late June to early August. Because of the drought conditions on the southern prairies, brood counts on Area I were merely a formality.

Table IV. - Brood Counts, Area I.

Species	June	July	Total Production*
Mallard	0	1	1
Pintail	2	2	4
Totals	2	3	5

\* The location of the pintail broods observed in June and in July was such as to assure the observer that they were not repeat observations.

Table V. - Brood Counts, Area II\*.

Species	June	July	August	Total Production
Mallard	-	7	11	15
Pintail	1	18	39	49
B-w. teal	-	1	26	26
Shoveler	-	8	8	9
Baldpate	-	-	6	6
Gadwall	-	-	1	1
Scaup	-	-	6	6
Totals	1	34	97	112

\* Age classification of broods on each count used to compute total individual broods seen.

A breeding population of 319 pairs producing 112 broods by August 1 represents a breeding success of 35.1 percent. Thus with an August brood average of 6.6 ducklings per brood 319 pairs produced at least 739 young or an increase of 116 percent in area population.

Table VI. - Brood Counts, Area III.

Species	June	July	August	Total Production
Mallard	4	5	19	22
Pintail	1	2	2	4
Gadwall	-	-	1	1
Baldpate	-	1	5	6
B-w. teal	-	6	54	54
G-w. teal	-	2	8	9
Shoveler	-	-	2	2
Redhead	-	-	1	1
Canvasback	1	1	8	8
Scaup	-	-	8	8
Ruddy	-	-	8	8
Bufflehead	-	-	1	1
Totals	6	18	117	124

This study area began the season with 489 breeding pairs. One hundred and twenty-four broods represents a brood success of 25.3 percent. The average brood size per Class III brood was found to be 5.83 ducklings per brood. In other words 124 broods comprised 723 ducklings of flying age or a reproduction of 72 percent above the breeding population.



Table VII. - Brood Counts, Area IV.

Species	June	July	August	Total Production
Mallard	5	12	31	31
Pintail	-	6	9	9
Gadwall	-	-	3	3
B-w. teal	-	1	15	19
G-w. teal	-	1	19	9
Baldpate	-	-	9	15
Shoveler	-	-	5	5
Redhead	-	-	3	3
Canvasback	-	2	4	4
Scaup	-	-	6	6
Bufflehead	-	-	1	1
Ruddy	-	-	1	1
Unidentified	-	-	1	1
Totals	5	22	107	107

In arriving at a total production figure the final brood count has been used. This becomes necessary because of the age of broods observed during the first and second counts. With a breeding population of 470 pairs, a production of 107 broods indicates a brood success of 22.8 percent as compared to a nest success of only 27.9 percent. One hundred and seven broods which averaged 6.4 ducklings per brood at Class IIB and III size represent 685 ducklings or a population increase of 72.9 percent.

It now appears after a few years of study that though parkland areas of Alberta may have greater breeding populations than do the prairies per unit area, predation losses are greater and total production falls below prairie standards. Nevertheless present indications lead us to suspect that periods of severe drought and years of early agricultural practices detrimental to nesting waterfowl on the prairies may over a period of years cause production in both areas to equalize. Further detailed ground studies in both strata will provide us with firmer ground on which to base our beliefs.

#### Aerial versus Ground Coverage of Breeding Populations

An aerial Census of breeding pairs was flown at least twice on each study area in May and early June. For purposes of comparison results are compiled here of those surveys taken during the peak of the populations to coincide with data recorded in Table II.

Table VIII. - Comparison of Ground and Aerial Pair Counts.

Species	Area I			Area II			Area III			Area IV		
	Ground	Air	% Seen in Air	Ground	Air	% Seen in Air	Ground	Air	% Seen in Air	Ground	Air	% Seen in Air
Mallard	41	20	48.8	56	37	66.1	151	68	45.0	169	65	38.5
Pintail	83	43	51.8	133	44	33.1	20	5	25.0	41	29	70.7
Gadwall	5	6	120.0	4	2	50.0	8	2	25.0	8	4	50.0
Baldpate	10	2	20.0	19	-	00.0	30	3	10.0	50	8	16.0
G-w. teal	2	2	100.0	-	1	-	18	4	22.2	30	1	3.3
B-w. teal	18	7	38.9	30	13	43.3	117	36	30.8	103	22	21.4
Cinn. teal	-	-	-	-	-	-	1	-	00.0	-	-	-
Shoveler	40	12	30.0	40	18	45.0	9	3	33.3	14	8	57.1
Redhead	-	-	-	2	-	00.0	8	-	00.0	4	2	50.0
Canvasback	-	-	-	14	1	7.1	21	4	19.0	15	2	13.3
Scaup	-	1	-	19	11	57.9	73	45	61.6	30	18	60.0
Ruddy	-	-	-	1	-	00.0	13	-	00.0	2	-	00.0
Bufflehead	-	-	-	-	-	-	18	-	00.0	3	1	33.3
Golden-eye	-	-	-	-	-	-	1	-	00.0	1	-	00.0
Unidentified	-	6	-	1	53	-	1	-	-	-	72	-
Totals	199	99	49.7	319	180	59.7	489	273	55.8	470	232	49.4

Except on Area I, all aerial observations on Alberta study areas this year appear to reflect the late growth of emergent and edge vegetation. As a result the aerial crew observed a higher percentage of the population than had been possible in previous years. In the case of Area I, on the bald prairie, the low figure of observed ducks is attributed to an early morning count (aerial) versus a mid-day count by the ground crew two days prior to the date it was possible to fly the area. This, plus the rapid deterioration of water areas there, and a constant movement of birds out of the area may account for such a large discrepancy. In this district, it is normal for the aerial crew to observe about 90 percent of the populations noted by the ground crew.

Table IX. - Comparison of Ground and Air Brood Counts \*

Air	Ground		Air		% Seen by Air
I	2(6/30)	3(7/30)	1(6/30)	Not flown	50% June - July
II	34(6/30)	96(7/30)	14(6/30)	96(7/30)	41% " 100% "
III	18(6/30)	117(7/30)	6(6/30)	62(7/30)	33% " 53% "
IV	22(6/30)	107(7/31)	2(6/30)	34(7/31)	9% " 32% "

\* Adjusted for 1/4 mile transect.

Production on Area I was much too small to make any air to ground comparisons of much value. Because of the delayed nesting season the most satisfactory brood counts were those made about August 1. To some extent a coincidence but primarily because of lowered water levels and withdrawal of remaining water away from edge vegetation, the aerial brood count on Area II when adjusted for a 1/8 mile transect was identical with that obtained by a ground count. Aerial observations in June on all study areas were made under moderately unfavorable conditions of light and wind. Observations on July 30 and 31, on the other hand, were made under almost perfect aerial conditions for brood observation.

#### Summary

1. Water levels on Areas II and IV were about the same in May of 1954 as in May of 1953. June rains maintained levels until July when rapid deterioration of water reduced Area IV by 44 percent, Area II by 30 percent. Area III began the season with excellent water conditions and only by July did any reduction occur (17 percent). Area I in poor condition in May practically dried up by August.

2. Breeding populations varied considerably. Area I recorded 40.8 pairs per square mile (42.7 in 1953), Area II 102 pairs per square mile (100.2 in 1953), Area III 134.9 pairs per square mile (98.8 in 1953) and Area IV 73.7 pairs per square mile (78.6 in 1953). Except for Area III which witnessed an increase of about 37 percent, all areas had populations comparable to those of 1953.

3. Species composition of the areas vary as their vegetative types differ. In order of importance, the four most important species in each study area and the percent of composition of the total population which each represents are: Area I, pintail (41.7), mallard (20.6), Shoveler (20.1), and blue-winged teal (9.0); Area II, pintail (41.7), mallard (17.6), shoveler (12.8) and blue-winged teal (9.4); Area III, mallard (30.9), blue-winged teal (23.9), scaup (14.9) and baldpate (6.1); Area IV, mallard (35.9), blue-winged teal (21.9), baldpate (10.6) and green-winged teal and scaup (6.4 each).

4. Data indicates a nest success of 62.5 percent on Area II, 31 percent on Area III and 27.9 percent on Area IV.

5. Brood success was relatively low on all areas. Drought conditions reduced that on Area I to almost nothing. Observed success on Area II was 35 percent, on Area III 25 percent and on Area IV 23 percent.

6. Aerial observations on four study areas representing bald prairie, mixed prairie, open and heavy parkland indicated that 50 percent of the breeding population and 50 percent of the broods were seen by the aerial crew on the bald prairie in May and June, 60 percent of the population and 100 percent of the broods on the mixed prairie in May and July, 56 percent of the population and 53 percent of the broods in the open parklands and 49 percent of the population and 32 percent of the broods in the heavy parklands.

## WATERFOWL BREEDING GROUND SURVEY, SASKATCHEWAN- 1954

J. B. Gollop and J. J. Lynch

### Introduction

This report covers the aerial phase of the waterfowl breeding ground survey in that part of Saskatchewan lying south of  $54^{\circ}$  N and a summary of the achievements of the banding crew for 1954. Reports covering northern Saskatchewan and special ground study areas are to be found elsewhere in this report.

### Methods, Personnel and Equipment

The system of strata and transects used in the aerial surveys in 1954 is practically the same as that figured in the 1952 report.\* The one-quarter mile wide strip for breeding pairs and one-eighth mile wide strip for broods was again used.

The status of the breeding pair population was determined between May 10 and 20 by flying the 5000 mile pattern of air transects which sample 114,000 square miles of southern Saskatchewan. These were completely covered again between July 9 and 20 in making the brood survey. Special coverages were given parts of the pattern in late May, late July and early August as well as the ground study areas in May and July. Pilots Ross Hanson, John Lynch, Charles Evans and Vern Conover, U. S. Fish and Wildlife Service, logged nearly 500 air-hours in three Piper PA-18 aircraft while flying more than 45,000 linear miles on these surveys. Observers were William Hyska, Saskatchewan Game Branch, Wes Newcomb and Marshall Stinnett, U. S. Fish and Wildlife Service, and Nolan Perret, Canadian Wildlife Service.

### Weather and Water Conditions

1953 and 1954 aerial index figures for May and July ponds by strata are given in Table I.

Saskatchewan had a dry fall in 1953, followed by a winter of almost normal snow and a spring with poor run-off. Dry surface soils robbed sloughs of snow water including that resulting from unseasonable April-May snows. From mid-May on, however, precipitation occurred in above normal amounts halting the drying trend in most of the western grasslands and inundating the parklands to the east and north. Surface water during the May survey compared as follows with the previous year:

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\* Waterfowl Populations and Breeding Conditions Summer 1952. Special Scientific Report: Wildlife No. 21.

May, 1954	34.7 ponds per square mile
May, 1953	32.7 ponds per square mile

Heavy rains continued through June and July to the extent that several weather stations in the southeast recorded more than 100 percent above normal precipitation for the April-July period.

July, 1954	24.7 ponds per square mile
July, 1953	22.4 ponds per square mile

The trend in precipitation has continued through August and September: 20 weather stations through the province have averaged 7.6 inches for those two months compared to a norm of 3 inches.

### Breeding Population Trend

A summary of the aerial spring survey is presented in Table I (1953-54 totals by strata), Table II (1953-54 over-all species indices) and Table III (1954 species indices by strata). Chart I gives a comparison with 1951, 1952 and 1953 of significant data used for forecasting purposes (as of June 1), based on this survey.

For the third consecutive year southern Saskatchewan's breeding population has been recorded at twice the highest level of the previous four years.

May, 1954	19.9 pairs per square mile (aerial figure)
May, 1953	16.4 pairs per square mile (aerial figure)

In species composition, as well as in size, the 1954 population was apparently almost identical with that of 1953. Mallards and pintails again made up 70 percent of the identified populations. Blue-winged teal were up and canvasbacks were down, but it is felt that this is because the figures for these two species were distorted in 1953 because of the mid-May freeze.

The survey was delayed until May 10 this year because of the presence of migrating swans, geese and ducks in the southern part of the province. Many lakes in the area were still ice-bound in mid-May.

In order to check on whether northbound transients had been counted and whether late arrivals from the south had been missed during the regular survey, those transects covered from May 10 - 13 were flown again at the end of the month. No significant changes were recorded.

### Success of the Season

Nesting: The 1954 nesting season got off to a very late start. The record-breaking cold wave that arrived late in April and lasted until about May 10 substantially delayed the early nesters - mallard and pintail - which made up the bulk of Saskatchewan's population. During early May these species were noted in flocks of pairs across the province. Once the weather moderated these flocks immediately dispersed into individual nesting pairs.

The percentage of birds recorded as lone drakes (assumed to have hens on nests) may be a valid indicator of the progress of the first nesting attempt.

May, 1954	43 percent of total recorded as lone drakes
May, 1953	44 percent of total recorded as lone drakes
May, 1952	58 percent of total recorded as lone drakes

This year's first attempt was at the same stage as 1953 but about a month behind 1952.

Broods - Actual and Potential ("Stand" and "Recovery") : A summary of the brood survey is presented in Tables I, II and III. Chart II gives a comparison with the three previous years of significant data used for forecasting purposes (as of July 25), based on this survey.

For the second successive year agriculture apparently ruined the chances for a "super duck crop" by plowing under many pintail and mallard nests in the grassland stubble fields around mid-June. Further east and north the season was somewhat later and as a result of these factors, the aerial brood index was under 100,000 - the lowest since 1950. Further emphasizing the lateness of the season, the ratio of broods to potential later broods (pairs, lone drakes and hens) was the lowest in recent years.

	<u>Actual Broods</u>	<u>Potential Later Broods</u>
July, 1954	0.86/sq. mi.	1.77/sq. mi.
July, 1953	1.61/sq. mi.	2.64/ sq. mi.

From Table II, it is evident that a good renesting effort and eventual late hatch could be expected for mallards; however, most of the pintails that lost their early nests apparently made no further attempts.

### Brood Size ("Field Factor")

	<u>Class I</u>	<u>Class II</u>	<u>Class III</u>	<u>Total Broods</u>
July, 1954	6.9	6.0	4.8	390+
July, 1953	7.0	5.5	5.7	644

This July 10 - 20, 1954, figure of 4.8 was lower than the subsequent July 26 - August 1 figure of 5.2 young in nearly mature broods. This might be accounted for by first nesting attempts started after the April-May cold wave.

### Brood Age ("Crop Maturity")

The degree of maturity of the duck crop in July has much bearing on the chances for eventual success of that crop.

July, 1954 - 0.65 II and III broods per square mile (72 percent of total)

July, 1953 - 1.1 II and III broods per square mile (69 percent of total)

Pintails and mallards were most advanced with a few individuals of these species flying. Actually, there were few broods of any age in the parklands at the time of the survey.

These figures would indicate a smaller, but equally late, first attempt in 1954 than that in 1953. The potential figure above would indicate that a smaller late crop could be expected.

### Meaning of "Potential Later Broods"

As a check on the "potential later brood" data collected in the regular July 9 - 20 brood survey, segments of the transect pattern were re-run in late July and early August. The following data has been recomputed for comparative purposes:

		Broods Per Sq. Mi.	Change From Previous Count	Later Broods Per Sq. Mi.	Total
A - East	July 10-13	0.8	-	4.9	5.7
	July 29-Aug. 1	3.2	300%	2.6	5.8
	Aug. 10-13	6.5	103%	1.3	7.8
A - West	July 11-15	1.1	-	2.0	3.1
	July 27-30	1.4	27%	0.5	1.9
B -	July 16-18	1.3	-	1.3	2.6
	July 29-30	1.8	39%	0.5	2.3
C -	July 14-15	0.8	-	1.3	2.1
	July 28	0.6	-25%	0.4	1.0

The number of actual broods increased on subsequent coverages in all strata but "C". This exception was probably because the moderate late hatch that was indicated failed to compensate for the advanced pintail and mallard broods that were flying by July 25. Flying broods are not recorded this late in the season because they cannot be distinguished from flying adults.



It will be noted that in Stratum A-East the August figure for actual broods exceeded that for early July broods and potential broods combined. The discrepancy is partly explained by the fact that there is always a certain percentage of nesting pairs that give no evidence of their presence during the regular July survey. These are the pairs whose hens are incubating clutches sufficiently far along that the drakes have banded up and left for moulting places.

The late surveys showed that under some circumstances the potential later broods indicated in the July survey, on which the final forecast must usually be based for regulations' purposes, do contribute significantly to the season's production. Furthermore, this Potentail later brood figure can be conservative, rather than optimistic.

### Banding

In 1954, eighteen workers took part in the Saskatchewan banding program, exclusive of personnel on special study areas. This compares with five or six in past years and was made possible because of the participation of State personnel from the Mississippi Flyway and an increase in U. S. Fish and Wildlife Service game management agents. The objective this year was correspondingly more restrictive--a province-wide sample of flightless young mallards. This made the operation much more difficult than in previous years when moulting adults or the young of all species were trapped.

The program was directed by J. B. Gollop, Canadian Wildlife Service, and F. A. Thompson, U. S. Fish and Wildlife Service. Federal, State and Provincial personnel were divided into four crews as follows:

C. R. Hayes, Leader, and L. M. Martin, U. S. Fish and Wildlife Service	R. C. Tice, Leader, U. S. Fish and Wildlife Service
J. M. Drennon and H. L. Shannon, Tennessee Game and Fish Commission	J. R. Tester, Minnesota Conservation Department
Vic Sorokowsky, Saskatchewan Game Branch	R. C. Henson, C. J. Perkins(part) and R. K. Yancey (part), Louisiana Wild Life and Fisheries Commission
D. W. Kriebel, Leader, U. S. Fish and Wildlife Service	R. Buller, Leader and Ashton Brann, U. S. Fish and Wildlife Service
David Donaldson and Carl Hunter, Arkansas Game and Fish Commission	L. G. Helm and F. B. Dowling, Missouri Conservation Commission

Banding was carried on between July 10 and August 12, under what were probably the most adverse conditions experienced during that period in recent years. Rain, a very late brood season, the nature of the program's objective and the fact that it was the first year for such an expanded operation caused results somewhat less than had been anticipated. On several occasions drives had to be postponed or cancelled and large numbers of birds had to be released because of rain; impassable roads were the order of the day. In spite of these difficulties, 1340 local (flightless young) mallards were banded in all sections of the province south of 53°. A total of 9376 ducks and 241 geese were banded. A summary of the catch is given in Table IV.

Because of the 1953 banding summary was omitted from last year's report, it is also presented in Table IV. This operation was carried out between June 30 and August 14, 1953, largely in the western part of the province and netted 6050 ducks and 238 geese.

#### Conclusion

For all practical purposes, the 1954 waterfowl hatch in southern Saskatchewan was nearly identical with the substantial, late-maturing hatch of 1953.

The Saskatchewan Grasslands ("A-West and "C") had a fair early hatch, plus a fair late hatch from June nestings, but an indifferent very late hatch from July nestings. The parklands (Stratum "B") had a fair early hatch, a good late hatch, and a moderate very late hatch. The southeast parklands (Stratum "A"-East) had an indifferent early hatch, an excellent late hatch from June nestings, and an altogether startling August hatch from July nestings.

In General, all of the important species of waterfowl that nest in Saskatchewan--the mallard in particular--produced enough young this season to maintain their present satisfactory status.

CHART 1. - WATERFOWL CROP FORECAST - Southern Saskatchewan (as of June 1, 1954).

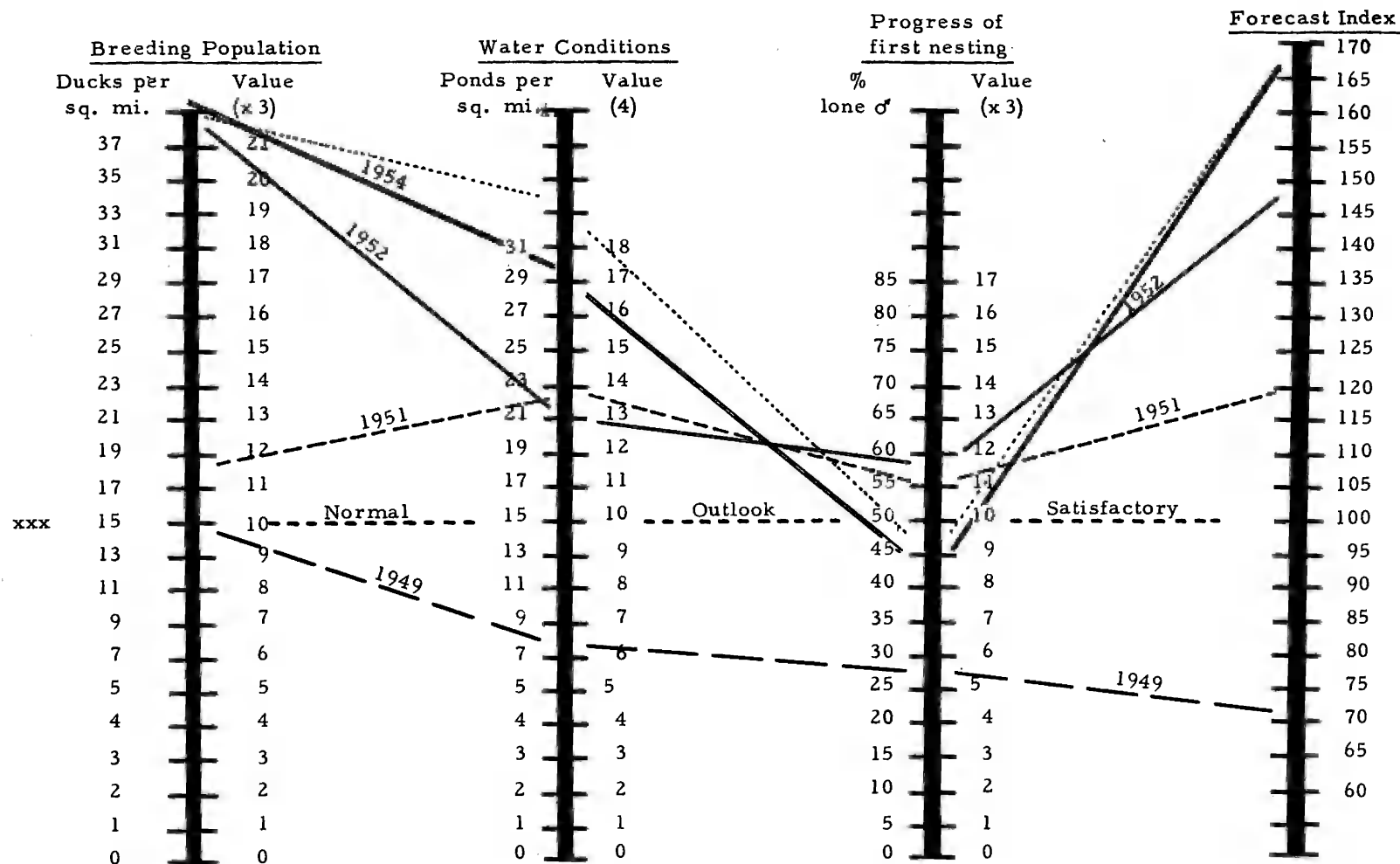


CHART 2. - Waterfowl Crop Forecast for Southern Saskatchewan as of August 1, 1954

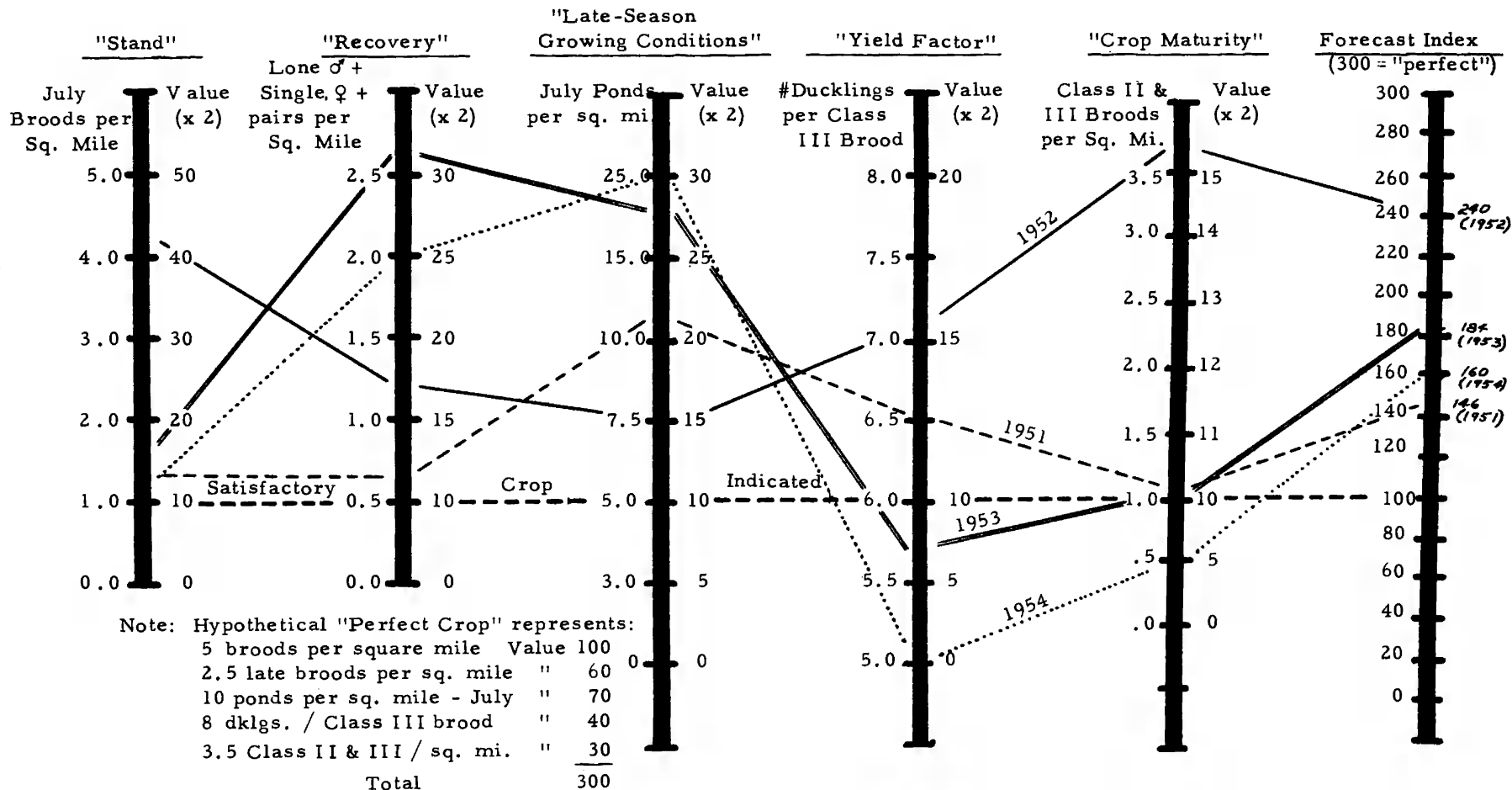


Table I. - Waterfowl Breeding Ground Survey - Southern Saskatchewan, 1953-1954 Duck-Brood-Pond Aerial Index Figures by Strata.

Strata Area	May 1953		May 1954		July 1953				July 1954			
	Ducks	Ponds	Ducks	Ponds	Broods	Later	Broods	Ponds	Broods	Later	Broods	Ponds
A - East S. E. Parklands 14,600 sq. mi.	415,700		709,600		8,180		84,680		9,200		64,240	
		509,100		864,300				748,980				1,230,800
A - West Grasslands 37,630 sq. mi.	1,774,300		1,388,500		46,650		122,300		37,450		62,460	
		974,600		669,800				812,810				336,790
B - N and W Parklands 50,520 sq. mil	1,742,900		1,970,200		107,120		74,600		43,450		66,170	
		2,041,000		2,233,000				889,150				1,117,120
C - "Shortgrass" Prairie 11,290 sq. mi.	652,500		470,800		21,690		19,420		8,180		9,500	
		203,200		188,500				100,480				73,380
Provincial Totals 114,040 sq. mile	4,585,400		4,539,100		183,640		301,000		98,280		202,370	
		3,726,900		3,955,600				2,551,420				2,758,090

Table II. - Waterfowl Breeding Ground Survey - Southern Saskatchewan, 1953-1954 Duck-Brood Species Indices.

Species	May Ducks			July, 1953		July, 1954	
	1953	1954	Change	Broods	Later Broods	Broods	Later Broods
Mallard	1,958,300	1,915,200	- 2%	92,130	107,890	49,710	81,420
Pintail	1,335,000	1,254,100	- 6%	36,250	32,870	19,200	10,980
Shoveler	255,100	267,700	+ 5%	18,550	13,390	10,750	5,360
Blue-winged teal	133,400	256,900	+ 93%	7,890	35,380	10,710	23,620
Lesser Scaup	208,800	215,500	+ 3%	3,870	28,450	370	12,590
Baldpate	184,800	178,500	- 3%	8,850	21,080	2,150	17,260
Canvasback	253,200	150,400	- 41%	7,220	15,660	2,690	3,240
Scoter	47,100	98,600	+ 109%	0	2,540	0	1,320
Gadwall	76,900	84,600	+ 10%	8,120	14,840	1,830	13,490
Redhead	84,800	67,200	- 21%	0	7,970	0	4,500
Green-winged teal	21,200	19,500	- 8%	0	3,460	0	4,770
Ruddy duck	17,500	13,500	- 23%	750	14,020	870	16,670
Golden-eye	600	7,900	+ 1217%	0	0	0	1,980
Ring-necked duck	400	5,500	+ 1275%	0	2,990	0	5,170
Bufflehead	8,700	4,100	- 53%	0	450	0	0
Total	4,585,800	4,539,200	- 1%	183,630	300,990	98,280	202,370

Table. III. - 1954 Duck-Brood Species Indices by Strata.

Species	A - East			A - West		
	Ducks	Broods	Later Broods	Ducks	Broods	Later Broods
Mallard	354,800	5,520	32,120	597,100	20,220	28,110
Pintail	149,100	2,020	2,570	444,300	8,240	5,000
Shoveler	28,400	460	1,930	97,200	2,250	1,870
Blue-winged teal	78,100	280	12,850	69,400	2,250	8,120
Scaup	24,800	0	2,570	48,600	370	2,500
Baldpate	21,300	280	5,140	69,400	1,870	6,250
Canvasback	17,700	640	640	20,800	750	620
Scoter	100	0	0	0	0	0
Gadwall	14,200	0	2,570	20,800	1,500	5,620
Redhead	9,200	0	640	13,900	0	1,870
Green-winged teal	4,900	0	1,930	2,800	0	620
Ruddy duck	2,800	0	1,280	2,800	0	1,250
Golden-eye	0	0	0	0	0	0
Ring-neck	3,500	0	0	0	0	630
Bufflehead	700	0	0	1,400	0	0
Total	709,600	9,200	64,240	1,388,500	27,450	62,460

Table III (Continued)

Species	B			C		
	Ducks	Broods	Later Broods	Ducks	Broods	Later Broods
Mallard	807,800	20,860	15,880	155,500	3,110	5,310
Pintail	463,000	6,080	2,650	197,700	2,860	760
Shoveler	104,400	7,390	1,320	37,700	650	240
Blue-winged teal	90,600	6,950	2,650	18,800	1,230	0
Scaup	128,000	0	7,280	14,600	0	240
Baldpate	69,000	0	5,300	18,800	0	570
Canvasback	102,500	1,300	1,980	9,400	0	0
Scoter	98,500	0	1,320	0	0	0
Gadwall	35,500	0	3,970	14,100	330	1,330
Redhead	39,400	0	1,990	4,700	0	0
Green-winged teal	11,800	0	1,980	Trace	0	240
Ruddy duck	7,900	870	13,900	0	0	240
Golden-eye	7,900	0	1,980	0	0	0
Ring-neck	2,000	0	3,970	0	0	570
Bufflehead	2,000	0	0	0	0	0
Total	1,970,300	43,450	66,170	471,300	8,180	9,500



Table IV. - Summary of Birds Banded, 1953 and 1954 (Exclusive of Birds Banded on Study Areas)

Species	1954						1953		
	Flightless Young			Adult		Grand Total	Young	Adult	Total
	Male	Female	Subtotal	Male	Female				
Canada goose*	2	3	5	117	119	241	12	226	238
Mallard	680	660	1,340	315	223	1,878	511	377	888
Gadwall	58	54	112	7	1	120	101	92	192
Baldpate	144	125	269	137	21	437	281	269	550
Pintail	560	476	1,036	1,132	829	2,997	616	1,190	1,806
G-w. teal	20	9	29	460	69	558	9	123	132
B-w. teal	370	298	668	1,169	275	2,612	618	776	1,394
Cinnamon teal	3	0	3	0	0	3	0	0	0
Shoveler	248	260	508	64	31	603	770	143	913
Wood duck	0	0	0	0	0	0	0	1	1
Redhead	14	17	31	42	35	108	5	17	22
Ring-neck	0	0	0	5	0	5	0	11	11
Canvasback	18	14	32	2	3	37	46	1	47
Lesser scaup	7	10	17	0	1	18	78	10	88
Ruddy duck	0	0	0	0	0	0	0	5	5
Total Ducks	2,122	1,923	4,045	3,843	1,488	9,376	3,035	3,015	6,050
Coot						126	78	136	214
Others						3	4	1	5

\*Canada geese were banded on Cypress Lake, Saskatchewan, on July 4, 1954, and July 2, 1953, with the help of the Alberta banding crews.

# WATERFOWL BREEDING GROUND SURVEY OF REDVERS AREA, SASKATCHEWAN, 1952-1954

Jerome H. Stoudt and Marshall Stinnett

## Introduction

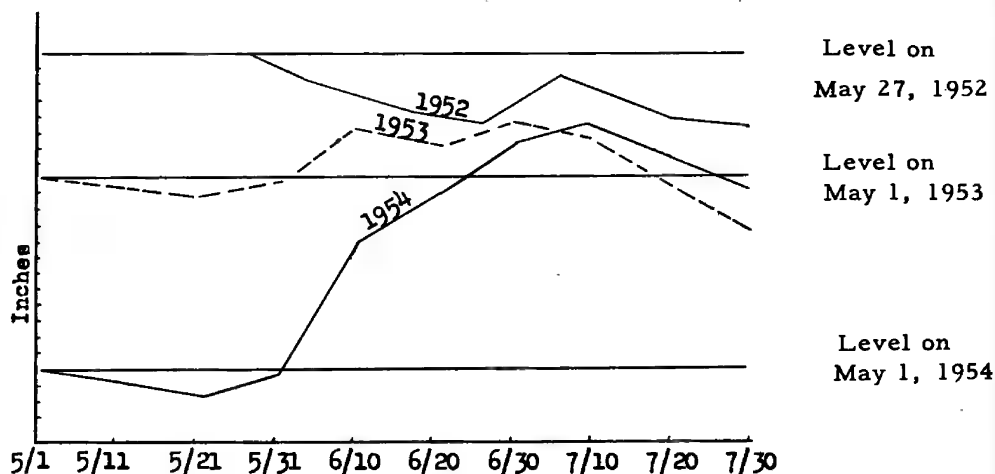
The Redvers Study Area was established in 1952 in the aspen-parklands habitat type of southwestern Saskatchewan in order to study waterfowl population dynamics, habitat preference and the effects of water, climate and predators upon the production and survival of young. The population data obtained was also to be used as a standard with which to determine percentages of breeding pairs and broods which were missed by aerial crews in this habitat type. Following is a brief summary of findings during the three-year period from 1952 - 1954.

## Weather and Water Conditions

The late summer, fall and winter of 1953-54 was very dry again as was the case the preceding year. February was exceedingly mild and what snow there was disappeared. The spring migration of waterfowl looked as if it would proceed right on into the Prairie Provinces during February or March but several cold fronts in March and April slowed things up considerably. Actually mallards started to nest the last week in April in considerable numbers in the Redvers Area. However, a severe snowstorm and sub-zero temperatures about May 1 caught most of the hens still laying and nests were abandoned to a large degree. Cold weather followed and re-nesting did not begin in earnest until about May 5, so that the nesting season was retarded a week or more.

Water levels on May 5, 1954 were 11.6 inches lower than on May 1, 1953, according to our 15 water gauges strategically located throughout the Study Area. This would make levels from 18 to 20 inches lower than in May 1952. The trend in water levels during May, June and July, is indicated by the following graph which is based on an average of all water gauges.

Three Years of Water Level Fluctuations, 1952-1954



The preceding graph illustrates the extreme rise in water levels during 1954 and while levels never did reach the high levels prevalent in May and June 1952, the fluctuation was much greater and caused considerable flooding of nests. Water levels were about equal on June 30 for all three years and actually lower on August 1 for the past two years than in 1952. However, water levels do not indicate actual conditions as regards brooding cover and vegetative growth in general. Low water levels in May of 1953 and 1954 encouraged germination of emergent aquatic plants so that emergent cover which developed during the summer was much more abundant in 1953 and tremendously more so in 1954. Then, too, water levels were 11 inches higher on August 1, 1954 than they were on May 1 or on June 1 and this meant that much of the emergent aquatic vegetation was still standing in from several inches to a foot or more of water in 1954, whereas, in 1952 many areas had dried up completely or water had receded from vegetation-lined shores by late July.

#### Water Areas

The percentages of water areas occurring during the four coverages during the three-year period are shown on Table I.

Table I. - Water Area Data, 1952-1954 - Number of Areas Containing Water on Each Coverage\*

	<u>1952</u>	<u>1953</u>	<u>1954</u>
Mid-May	306 (100)	306 (100)	232 ( 76)
First week in June	244 ( 80)	306 (100)	252 ( 82)
Mid-July	253 ( 83)	276 ( 90)	338 (110)
Late July - August	181 ( 59)	214 ( 70)	265 ( 87)

\* Based on 306 water areas considered to be normal for the area.

Figures in parenthesis are percentages.

Thus although water levels on semi-permanent areas were 7 inches higher on August 1, 1952 than they were on the same date in 1954, there were almost 60 percent more areas on August 1, in 1954 due to frequent rainfall in late July which kept shallow areas from drying up.

#### The Breeding Population

Two censuses of breeding pairs were made each year, the first beginning May 10, and second about three weeks later during the first week in June. Results are as follows:

Table II. - Breeding Pair\* Census - Redvers Study Area\*\*

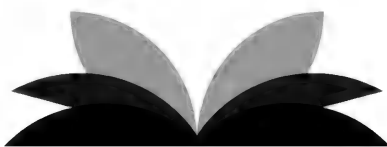
	<u>Breeding Pairs</u>			<u>Percent</u>		
	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
Mallard	265	258	215	44.1	43.6	42.4
Blue-winged teal	142	150	95	23.6	25.3	18.7
Pintail	64	55	73	10.6	9.3	14.4
Baldpate	32	31	42	5.3	5.2	8.3
Green-winged teal	32	34	30	5.3	5.7	5.9
Canvasback	23	24	24	3.8	4.0	4.7
Shoveler	12	13	14	2.0	2.2	2.8
Lesser scaup	15	12	4	2.5	2.0	0.8
Gadwall	7	6	8	1.2	1.0	1.6
Ring-necked	4	4	1	0.7	0.7	0.2
Redhead	4	4	1	0.7	0.7	0.2
Ruddy duck	<u>1</u>	<u>1</u>	<u>0</u>	<u>0.2</u>	<u>0.2</u>	<u>0.0</u>
Totals	601	592	507	100.0	100.0	100.0

\* Breeding Pairs = Lone drakes plus pairs.

\*\* Total Area = 5 square miles.

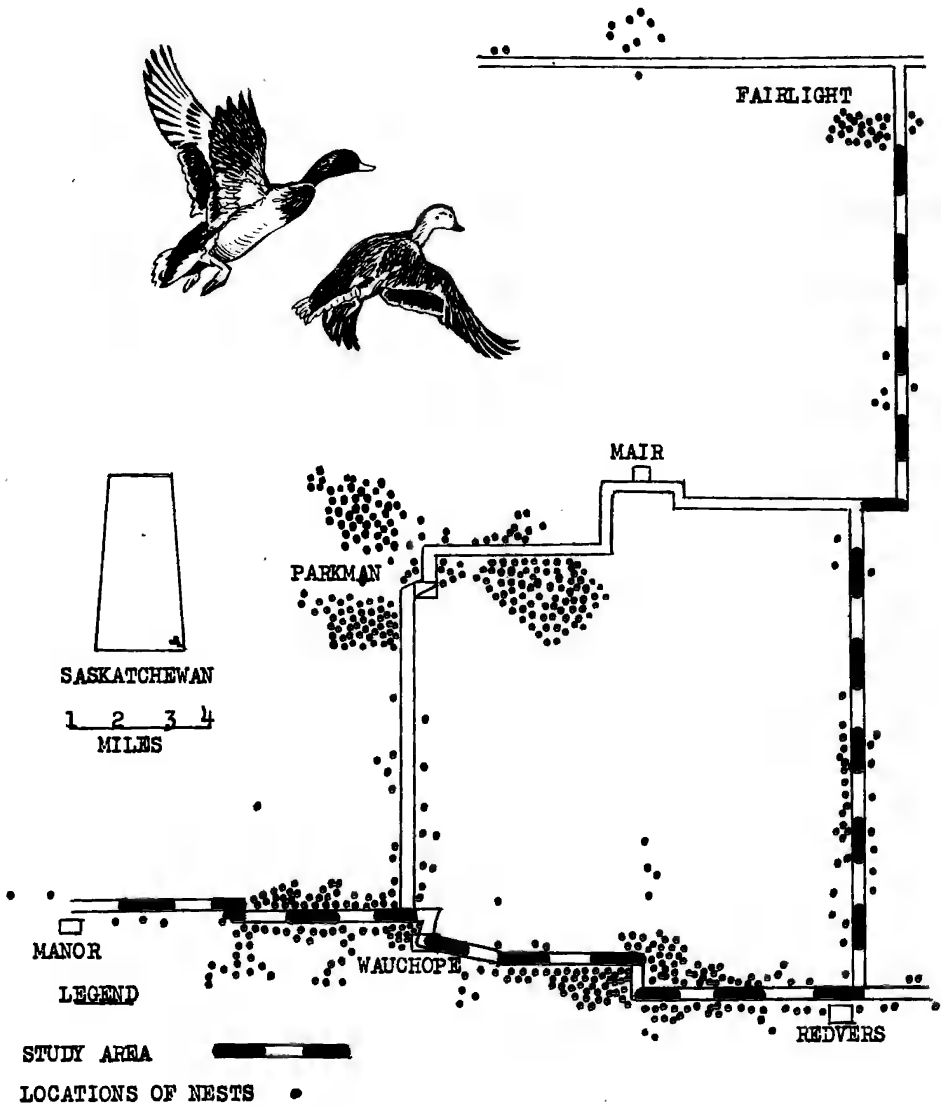
Although no significant changes occurred between 1952 and 1953, this was not true in 1954. From Table I we find that there were only 232 water areas present in May and 252 during the first week of June, 1954 as compared with 306 in 1952 and 1953. This represented a reduction in number of water areas of from 18 to 24 percent. Previous breeding pair-water area counts in the Dakotas had indicated a definite correlation between number of water areas and breeding pairs and on the Redvers Area, a drop of 18 to 24 percent in number of water areas was reflected in a drop of 15 percent in breeding pairs. Naturally certain of the species of low population density would not be affected by the drop in number of water areas, but the two main breeding species, namely--mallard and blue-winged teal--dropped 18 and 37 percent respectively. Thus the correlation between the number of small water areas and breeding pair population in the aspen parkland habitat may be closer than heretofore supposed. Also, these data seem to lend credence to the theory

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REDVERS STUDY AREA TRANSECT AND ADJOINING AREA



advanced in 1952 and 1953 that "breeding pairs on the prairie breeding grounds tend to make maximum use of the available small water areas and spill over into less favorable or submarginal habitat when maximum capacity has been reached." Apparently the water areas on Redvers Area had reached maximum carrying capacity in 1952 and the reduction in number of areas in 1954 forced some breeders to move elsewhere.

In 1954 there were 3.03 pairs per acre on wooded water areas and 2.20 pairs per acre on open water areas. In addition to being smaller in size, the wooded areas were somewhat more attractive, especially to mallard in 1954, due to the fact that receding water levels on open areas left barren shorelines with little or no concealment cover in many cases.

### Nesting Success

Six hundred nests were located during the nesting season of 1954. Thirty-two percent of the nests were found by a black Labrador dog. Table III lists nest history data for both active and inactive nests. The former being those from which a hen was flushed and the nest followed through to completion. Inactive nests were again a poor yardstick of nest success due to the extreme difficulty of finding hatched-when-found nests in the rank, heavy cover in late June and July.

Table III. - Nest Data Summary - Redvers Study Area Summary of All Nests Found by Species.

Species	Total Found	Abandoned*	Total Left	Destroyed	Hatched	Percent Success
Mallard	433	38	395	320	75	19.0
B-w. teal	63	9	54	44	10	18.5
Pintail	24	3	21	13	8	38.1
Canvasback	29	2	27	13	14	51.8
Baldpate	6	0	6	5	1	16.7
Lesser scaup	7	0	7	3	4	57.1
G-w. teal	11	1	10	10	0	0.0
Ring-necked	10	1	9	5	4	44.4
Redhead	1	0	1	0	1	100.0
Shoveler	12	2	10	6	4	40.0
Gadwall	5	0	5	2	3	60.0
Totals	601	56	545	421	124	22.7

\* These nests were apparently abandoned due to the observer finding the nest.

Summary of Active Nests Only

Species	Total Number of Active Nests	Destroyed	Hatched	Percent Success
Mallard	266	202	64	24.1
Blue-winged teal	39	29	10	25.6
Pintail	19	12	7	36.8
Canvasback	25	12	13	52.0
Baldpate	6	5	1	16.7
Lesser scaup	7	3	4	57.1
Green-winged teal	8	8	0	0.0
Ring-necked	9	5	4	44.4
Redhead	1	0	1	100.0
Shoveler	10	6	4	40.0
Gadwall	5	2	3	60.0
Total	395	284	111	28.0

The extremely high nest destruction in 1954 was due primarily to the weather. First nesting attempts of the mallard were broken up by the blizzard and zero temperature of May 1. May and June were characterized by cold, very wet weather which retarded the development of good nesting cover. In addition, the dry fall of 1953 and the following winter encouraged and enabled the farmers to do a terrific amount of burning. Burning coupled with low pond levels left only a narrow strip of grass or cattails around the pond margins. This condition allowed easy access to nests by predators. Also, the cold weather retarded development of other predator food such as herbs, young mice and ground squirrels, insects, etc. which caused predators to turn in greater-than-normal intensity to duck nest hunting. Then too, actual flooding of nests was a serious factor in 1954.

Nest Destruction for all Species by Causes

Crows and Magpies	33%	Flooding	11%	Desertion	2%
Skunk	32%	Other mammals	4%	Burning	1%
Ground Squirrels	12%	Unknown	4%	Road construction	1%

From the data in the following table we find that nest success was considerably lower for nearly all species in 1954. Nest success for the mallard in 1952 might be a bit high due to the fact that few nests were found before the 15th of May.



Table IV. - Nest Success Over Three-Year Period (Active Nests Only).

	1952		1953		1954	
	Success in %	No. of Nests	Success in %	No. of Nests	Success in %	No. of Nests
Mallard	56.9	58	48.9	219	24.1	266
Blue-winged teal	43.3	30	37.0	46	25.6	39
Pintail	28.5	7	59.1	22	36.8	19
Canvasback	33.3	3	70.8	24	52.0	25
Shoveler	-	-	100.0	3	40.0	10
Green-winged teal	100.0	1	66.7	3	0.0	8
Lesser scaup	50.0	4	57.1	7	57.1	7
Ring-necked	-	-	60.0	5	44.4	9
Baldpate	40.0	5	25.0	4	16.7	6
Gadwall	50.0	2	100.0	2	60.0	5
Redhead	-	-	25.0	4	100.0	1
Total	49.5	111	50.1	340	28.0	395

Table V. - Mallard Nesting Success by Cover Types.

Cover Type	1952		1953		1954	
	No. of Nests	Percent Success	No. of Nests	Percent Success	No. of Nests	Percent Success
Snowberry	40	35.0	111	36.0	83	12.0
Grassy Cover Types	47	55.3	88	47.7	173	22.5
Cattails, Sedges-Rushes	2	100.0	48	50.0	82	20.6
Willow and Aspen Reprod.	11	64.0	21	66.7	16	12.5
Mixed Brush	-	-	9	44.0	22	10.0
Mixed Weeds-Grasses	27	40.7	9	22.2	13	8.3
Miscellaneous	-	-	4	50.0	6	33.3
Total	127	47.2	290	44.1	395	19.0

Note that in 1954 fewer nests were found in the snowberry cover types. In many snowberry patches the ground was matted down with mud caused by dirt and snow from the May 1 blizzard. Nest success was again well below average for the snowberry types. Grassy cover types were the mainstay of the mallards in 1954 and in the rank stands of grass in low spots between wheat fields and ponds, the success increased to 32 percent or nearly 70 percent better than average. Ninety-three or 23 percent of all nests found were located between a road and adjoining fields or pastures. Nesting success in this habitat averaged only 15 percent or 20 percent below average. This was in contrast to a better-than-average success for roadside nests in 1953 but the blizzard of May 1 played havoc with roadside nesting cover also.

### Brood Production

The first brood census in 1954 was taken on July 13-17, and the final count on August 4-6, both approximately the same time as in 1953 and about ten days later than in 1952. Only 38 broods were found on the July count of which 19 were mallards. Total brood production for 1954 was calculated three different ways. The first method consisted of adding all broods from the July census to Class Ia, Ib, Ic and IIa broods observed on the August count. This calculation yielded only 82 broods and is believed to be too low due to very high water levels, abundance of temporary water areas and occurrence of rank vegetation standing in water during the July count.

In the second method, we added only Class III broods from the July count to all broods (except flyers), from the August census, to give a total of 95 broods.

The final census on August 4-6 yielded 97 broods including four flying broods and this is the figure we used for 1954 production. Due to "telescoping" of the nesting season, 1954 seems to be one year where one brood count made early in August would have yielded close to total production on the study area and general vicinity.

Total brood production in 1954 compared to the past two years is illustrated in Table VI.

Table VI. - Brood Population (Total Calculated Production).

	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>Percent Decrease in 1954*</u>
Mallard	122	101	45	60%
Blue-winged teal	62	63	21	66%
Pintail	19	20	5	75%
Baldpate	12	18	6	60%
Green-winged teal	14	6	4	60%
Canvasback	9	19	7	50%
Lesser Scaup	2	8	2	60%
Shoveler	6	6	5	17%
Gadwall	2	2	0	-
Ring-necked	1	1	0	-
Redhead	0	2	2	0
Total	249	246	97	61%
Remaining potential**	14	17	16	-

\* Percent decrease from 1952-1953 average. These years the Redvers

Area was considered to be a nearly maximum carrying capacity.

\*\* Remaining potential includes pairs, lone drakes and lone females on area.

By subtracting the potential as of August 4-6 from the breeding pair counts in Table II and comparing them to the brood population in Table VI, the success of the breeding pairs (percent of successful females) can be approximated as shown in Table VII.

Table VII. - Percent of Females Producing Broods.

	<u>1952</u>	<u>1953</u>	<u>1954</u>
Mallard	46.2	39.1	21.3
Blue-winged teal	46.3	42.0	23.3
Pintail	29.7	37.0	6.9
Baldpate	40.0	66.7	15.0
Green-winged teal	46.7	19.3	13.3
Canvasback	39.1	86.4	30.4
All others	26.2	50.0	33.3
Averages	42.4	42.8	19.7

From the above data we find 1954 brood production down for all species. However, some of the late nesting species such as the scaup, ring-neck, gadwall and ruddy duck were not as seriously affected by the cold, wet weather of May and June. The total number of these species on the area is too few to allow accurate analysis by species.

For the third consecutive year, nesting success data and broods produced per female have paralleled each other quite closely.

Table VIII. - Nest Versus Brood Data.

	<u>1952</u>	<u>1953</u>	<u>1954</u>
<u>Mallard</u>			
Nesting success in percent	56.9	48.9	24.1
Percent of successful females	46.2	39.1	21.3
<u>All Species</u>			
Nesting success in percent	49.5	50.1	28.0
Percent of successful females	42.4	42.8	19.7

### Brood Averages

Brood averages from the Redvers Study Area and from a radius of not more than 20 miles distant, follow in Table IX.

Table IX. - Brood Averages by Age Classes.

	<u>Class Ia</u>			<u>Class III</u>			<u>All Age Classes</u>		
	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
Mallard	6.96	6.91	6.14	6.13	6.55	5.47	6.42	6.74	5.98
Blue-winged teal	8.87	8.50	8.88	7.25	7.98	8.83	7.94	8.21	8.66
Pintail	6.40	7.12	4.50	5.00	5.19	4.18	5.62	5.82	4.38
Baldpate	8.40	7.68	8.15	7.00	7.15	-	7.81	7.23	7.19
Canvasback	7.25	6.42	5.64	5.64	6.07	3.75	6.28	6.43	4.66

Brood averages appear to be somewhat lower in 1954 except for the blue-winged teal. Causes for lower brood averages in 1954 were:

1. Prolific renesting caused by excessive predation, flooding and weather conditions.
2. Lowering of clutch size due to sharply rising water levels which caused some hens to add to (elevate) their nests. In most cases, some eggs were chilled or buried under the nest. One hen mallard started out with nine eggs and hatched one.

Teal brood sizes were not affected because they nested later, and when water levels reached their nests they abandoned the eggs and started a new nest.

### Roadside Brood Counts

Results of roadside brood counts for the three-year period are as follows:

	<u>1952</u>	<u>1953</u>	<u>1954</u>
Total miles covered	157	157	190
Total broods seen	251	342	151
Broods per lineal mile	1.60	2.18	0.79

We explained in our 1953 report that the roadside count showed an increase in that year over 1952 which actually did not occur. The roadside count was high in 1953 due to the later nesting season which caused a telescoping of the brooding season. In 1954, the breeding season was also telescoped and this year the reduction of 64 percent from 1953 compares almost exactly to the 61 percent decrease found on beat-outs.

Roadside transects by automobile are subject to the same errors as aerial brood counts. Changes in amount of emergent vegetation, water levels and in shoreline vegetation all affect accuracy between years. For some species such as most diving ducks and for the baldpate, the method is good. For mallards, and pintails, it is especially bad. A series of compensatory factors can be worked out to apply to each species but this in itself would require several years of intensive study in order to encounter all the various fluctuations in visibility due to environmental changes.

Banding Returns from 1953 Banding on Redvers  
Study Area

Following is a brief summary of band returns received during the first year after banding. All ducks were shot between September 15, 1954 and January 4, 1954.

Table X. - Number and Location of Returns.

Species	Number Banded	Returns Per 100 Banded	Canada	Pacific Flyway	Central Flyway	Miss. Flyway	Atlantic Flyway
Mallard	196	16.3	11	0	12	9	0
B-w. teal	51	3.9	1	0	0	1	0
Baldpate	31	12.9	1	0	2	0	1
Pintail	13	30.7	0	1	2	1	0
Shoveler	11	9.1	0	0	0	0	1
Canvasback	7	14.1	1	0	0	0	0
Redhead	3	33.3	1	0	0	0	0
Total	312	14.4	15	1	16	11	2
Percent	-	-	33.3	2.2	35.6	24.4	4.4

Significant facts from the above data are, (1) large number of returns (13), from the immediate vicinity of the banding area; and (2) wide distribution of returns which range from Saskatchewan to California and Texas, and from Ontario to Virginia and Florida.

Only 79 ducks were banded in 1954 due to extremely adverse banding conditions. Banded were: 38 mallards, 14 pintails, 10 blue-wings and 8 other ducks.

WATERFOWL BREEDING GROUND SURVEY - SASKATCHEWAN  
1954  
SPECIAL STUDY AREA - KINDERSLEY-ESTON

Introduction

Most of the field work on which this report is based was carried out by Maurice H. Lundy, Game Management Agent, U. S. Fish and Wildlife Service, and by Richard W. Fyfe, summer assistant, Canadian Wildlife Service. The writer was in charge of the operation but was unable to take part full-time until July.

The waterfowl survey and banding operations described below were carried out as part of an investigation of waterfowl damage to cereal crops in the Kindersley-Eston-Kerrobert area of west-central Saskatchewan. Emphasis in all phases of the study was on mallards.

Water Conditions

A comparison of water areas in May of 1953 and 1954 on the 20.5 square mile transect is as follows:

	<u>Semi-permanent</u>	<u>Pieces of Ditch</u>	<u>Temporary</u>	<u>Other</u>	<u>Total</u>
May 11-13, 1954	7	176	4	8	195
May 20-21, 1953	55	173	38	9	275

The steady long term drop in water areas from May, 1953 through the open winter of 1953-54 is indicated by the decrease in areas classified as semi-permanent. The lack of spring run-off in 1954 is emphasized by the decrease in temporary (shallow field water) areas. While the number of ditches held up, they were more shallow than in the previous spring and their number had dropped to 39 (from 176) in the three weeks following the May coverage.

Surface water this year continued to drop through July but August rains raised and created water areas so that the southern part of the district looked like it did a full year before and the northern part apparently had more sheet water than in May, 1953.

Precipitation from April 1 was officially recorded as follows:

	<u>To June 8</u>		<u>To July 3</u>		<u>To August 4</u>		<u>To Sept. 4</u>	
	Total	% Change from Normal	Total	% Change from Normal	Total	% Change from Normal	Total	% Change from Normal
Kindersley	2.82	+ 7%	4.89	+11%	7.20	+ 7%	10.56	+24%
Rosetown 50 mi. E.	3.59	+12%	7.64	+40%	11.01	+42%	17.08	+80%
Empress, 51 mi. S. W. Alta.	2.55	-17%	4.57	-14%	6.66	- 7%	9.74	+ 4%

#### Breeding Population

According to transect data collected May 11-13 and on June 4, there were 25.8 pairs of ducks per square mile this year compared to 50.1 in 1953. However, the 1954 data are not considered reliable, because: 1. There was a cluster problem in that in May 88 percent of the 474 indicated pairs were located on 10 percent of the 195 water areas. Linear transects (one-quarter mile wide) are inadequate under such conditions. 2. Approximately 75 percent of the 474 pairs were recorded on seven large sloughs, partly in and partly out of the transect. This means that 75 percent of the sample population were noted on the near side of an imaginary transect line drawn 220 yards from the road. Any number of factors might shift birds back and forth across this line and it is impossible to determine how many belong within the sample to give a true picture.

The combined May-June figures for indicated pairs by species for 1954 and 1953 are as follows:

	<u>Pintail</u>	<u>Mallard</u>	<u>Shoveler</u>	<u>B-w. teal</u>	<u>Baldpate</u>	<u>Gadwall</u>	<u>Scaup</u>	<u>Others</u>	<u>Total</u>
May-June, 1954	134	197	56	57	40	23	26	16	549
May-June, 1953	421	299	93	69	54	29	30	32	1027

#### Production

No brood surveys were made because of the clustering problem that existed. Total counts would appear to be the only effective method of determining production but these were not practical from the ground because of the large area involved and the large size of brood sloughs, both those which were bare of emergent vegetation, and those completely choked by it. There was no opportunity to try an aerial beatout of the district.

The following examples indicate the magnitude of the clustering problem:

1. On July 15-16 and August 8-9, 501 flightless young mallards were banded on two adjacent sloughs lying in one-half square mile of land. Not all of the mallards were caught and there were at least as many young of other species present, making a total of well over 1000 young ducks (175+ broods) on approximately 120 acres of water. To complicate census work further, practically all of these birds customarily loafed on one small stretch of shore.

2. On July 30, exactly 200 local mallards were banded on a slough beside the town of Marengo. It was estimated that there were approximately 600 young of all species on this 300-acre + slough.

The foregoing situations were not unique; more than 50 local mallards were banded on each of five other sloughs in the same 300-square mile block. In both cases noted above there were within a two-mile radius both smaller and larger sloughs with fewer or no broods. The three water areas cited had no emergent vegetation; the first two were about twelve inches deep and each had a thick blanket of algae; the third was over six feet deep in places, and had pondweed and possibly some other submergents in it.

The initial hatching peak of mallard and pintail began the second week in June--almost two weeks later than in 1953. On June 4, 1954 no broods were recorded on the transect; on June 10-11, 1953, 124 were noted. As in 1953, pintails apparently produced young only from their first attempts in May and early June; flightless young pintails were scarce after August 1. Mallards on the other hand continued to produce young through July but apparently ceased nesting activity earlier than last year.

Brood sizes compare as follows:

	<u>Mallard</u>	<u>Pintail</u>
Class Ia June 12-July 2, 1954	6.4 (46)	5.6(25)
Class I June 10-11, 1953	6.4 (63)	5.4(112)

#### Banding

Banding was carried out within a 22-mile radius of the Kindersley Game Preserve, seven miles west of Kindersley, Saskatchewan. The aim was to trap and mark as many mallards as possible for later observation in connection with depredations on cereal crops. The birds were marked by means of plastic neckbands--yellow with red, green and blue surface colors until August 15, and blue with orange, white and yellow surface colors August 15 - September 19.

In addition to Lundy and Fyfe, Harvey Beck, University of Saskatchewan, gave substantial assistance during the banding program. On two drives, Seth Low and Dick Cole, U. S. Fish and Wildlife Service, assisted, and on single drives the U. S. Fish and Wildlife Service - State crews under Charles Hayes and Rex Tice also helped.



The methods included drive-trapping and use of dogs (a Chesapeake Bay Retriever and a yellow Labrador) until August 15. After that date, bait-trapping was the main method, although some use was made of cannon net traps.

Attempts to trap mallard hens on nests were unsuccessful during May and June. Practically all of the flightless young and all territorial hens and moulting adults were banded between July 13 and August 12.

A summary of the birds banded is presented in Table I. Females referred to as "territorial", were flying hens caught in covered traps (after July 29) on drives for flightless young. They were assumed to be with broods and are considered to be in the same category as adults trapped on their nesting "territory" and hens caught on nests (as opposed to moulting adults whose nesting areas is unknown).

Table I. - Summary of Birds Banded - June 24 - September 19, 1954.

	Young						Adults						Total
	Local <sup>1</sup>		F.	Immature <sup>2</sup>			Flying			Moulting			
	M.	Un. <sup>3</sup>		M.	Un.	F.	M.	Un.	T.F. <sup>4</sup>	O.F. <sup>5</sup>	M.	F.	
Mallard <sup>6</sup>	792	7	773	38	-	34	21	1	25	26	8	17	1742
Gadwall	2	-	-	1	1	3	-	-	1	-	-	-	8
Baldpate	41	-	28	7	-	8	-	-	3	-	-	-	87
Pintail	262	2	247	4	1	6	-	-	-	2	1	8	533
G-w. teal	5	-	5	1	-	-	-	-	-	-	18	-	29
B-w. teal	-	-	2	30	-	47	19	-	1	25	9	2	135
Shoveler	30	-	25	-	-	-	-	-	-	-	-	-	55
Lesser Scaup	-	-	-	2	-	2	-	-	-	-	-	-	4
<hr/>													
Subtotal	1132	9	1080	83	2	100	40	1	30	53	36	27	2593
<hr/>													
Coot	-	-	-	-	-	-	-	1	-	-	-	-	1
Sharp-tailed grouse	-	1	-	-	-	-	-	-	-	-	-	-	1
Others (12 species)	-	85	-	-	-	-	-	-	-	1	-	-	86
<hr/>													
Total	1132	95	1080	83	2	100	40	2	30	54	36	27	2681

1 Local: preflight young.

2 Immature : flying young.

3 Un. : not sexed.

4. T.F. : territorial hens (on nests or with broods).

5 O.F. : other flying hens (bait-trapping, injured, etc.)

6 Mallard : of which the following numbers were neckbanded:

491	4	449	37	-	32	19	1	-	19	-	-	1052
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## WATERFOWL POPULATIONS AND BREEDING CONDITIONS

IN SOUTHERN MANITOBA, 1954

Charles D. Evans

### Introduction

This report will deal with the results of the aerial survey conducted in the areas outline in Figure 1, as well as the banding of flightless young in the pothole country. Work done on the district 8 ground transects will be reported separately. The results of transects run by Manitoba Game Branch Conservation officers will be reported in appendix form. The air work flown in a Piper Super Cub and the banding were conducted by the following personnel. May air survey: Pilot C. D. Evans and observer, W. C. Newcomb of the Fish and Wildlife Service. July air survey: Pilot C. D. Evans, Fish and Wildlife Service and observer, Nolan Perret, Canadian Wildlife Service. Ground transects in district 8: G. Pospichal, Fish and Wildlife Service, Barkley Cram and Glen Parsons of the Manitoba Game Branch. Banding crew (July 10 to August 15): W. C. Newcomb, Fish and Wildlife Service, James Dahlen and Gordon Orians of the Wisconsin Conservation Department, and Leo Pospichal of the Michigan Conservation Department. Other population studies in Manitoba were carried on by S. T. Dillon on the Delta Marsh and Alex Dzubin in the pothole country, both under the auspices of the Wildlife Management Institute.

### Weather and Water Conditions

Precipitation in southern Manitoba during the fall of 1953 and early spring of 1954 varied from near-normal (meaning droughty) in the southwestern portion of the Province to abnormally high in the rest of the area covered. In the former area, as reported by Game Branch officers and indicated by their water gauge readings, winter snows were light and runoff was negligible. The number of ponds containing water during the spring run of southwestern Game Branch transects from 1951 to 1954 were as follows: 1951 - 1,413 ponds; 1952 - 818 ponds; 1953 - 709 ponds; 1954 - 493 ponds. In that area, waterfowl habitat started off the season in poor shape. Water conditions in the remainder of the two strata varied from good to excellent. Eight miles of transects in the west central portion of the Province showed little change from last year; 1954 ponds in 1953 and 180 ponds in 1954. Of the 120 study potholes scattered throughout the transects in district 8, six were dry by May 31 this year as compared to none in 1949, none in 1950, two in 1951, 20 in 1952 and none in 1953. Four of the six dry this year were in the southwestern portion of the district. In other areas, water conditions were so good that many farmers have had difficulty getting into their fields for seeding and cultivation of summer-fallow. Table I shows the aerial pond count for 1954 as compared to the three previous years.

Although the increase this year may be somewhat exaggerated due to the lateness of the breakup and the relatively early date on which the survey was conducted, the increase shown is quite considerable and the wet portions of the Province more than compensated for the dry areas.

Table I. - Water Area Index, Southern Manitoba May Aerial Survey.

Year	Ponds in Stratum A	Ponds in Stratum B	Ponds in Strata A and B
1951	240,500	185,900	426,400
1952	174,200	155,400	329,600
1953	186,600	311,700	498,300
1954	258,200	1,075,400	1,333,600

The spring breakup was slow and snows with freezing temperatures in late April and early May retarded the start of nesting, although many birds had already arrived in April. Alex Dzubin reports that by April 20, about 80 percent of the normal May 15 population of mallards and pintails were settled down on the Roseneath area. May and early June were generally cool and wet. Rains during the period from June 4 through June 8 were considerable, concentrating along the southern border of the Province and tapering off northward. There were scattered violent showers in some areas. Virden reported 3.11 inches of rain fell in one 24 hour period. However, no stations north of Rivers and Brandon, which mark the southern limit of the best breeding range this year, reported over 2.3 inches for the four-day period, or over 1.6 inches in one day. The remainder of June also experienced above normal precipitation. July was more nearly normal and precipitation occurred mainly in the form of local showers. However, water levels were still extremely high, potholes generally being flooded into the shoreline vegetation or into grain fields.

Table II shows the July aerial pond count for Stratum A.

Table II. - Ponds in Stratum A, Manitoba Counted During Production Surveys.

Date	Index	Ponds per Square Mile
July, 1952	125,971	12.2
July, 1953	150,854	14.6
July 14-18, 1954	472,362	45.6
July 28 - August 2, 1954	254,629	24.6

It may be noted that the water area indices for previous years have been altered. Experiments conducted by J. Lynch have shown that two-thirds of the areas falling within a one-eighth-mile strip also fall within the one-sixteenth-mile. Thus, water area counts made on the one-sixteenth-mile strip on both sides (1952 and 1953) were multiplied by the factor 0.75 for comparison with 1954 data. (Ponds counted on 1/8 mile on one side).

There was ample water throughout the area for nesting and brooding probably to much water for optimum nesting success. However, by late July when Stratum B was flown for broods, water levels had already dropped and the pond index was 384,200, considerably below the May figure. By the end of July the figure for Stratum A had also dropped below that of May, although still higher than previous July readings.

#### Breeding Population

The cool wet spring was reflected not so much in late arrival of birds, as in a late start of nesting. Many birds were still concentrated on the larger sloughs and gathering places. Even at the start of the air survey, delayed until May 11, there were a few birds, mainly diving ducks, which had not yet settled down on the nesting grounds. However, by the time the survey was well underway, these birds had dispersed and begun their nesting activities. May populations are shown in Table III. The lower part of the table shows the 1953 and 1954 data corrected for absent hens on their nests. The upper portion of the table shows data for these same years made comparable to 1951 and 1952 when Strata A and B data were not corrected for absent females.

Table III. - May Waterfowl Population Indices, Southern Manitoba Aerial Survey.

Year	Stratum A (10,368 Sq. Mi.)	Stratum B (28,600 Sq. Mi.)	Strata A and B (38,968 Sq. Mi.)
1951	472,800	165,900*	638,700*
1952	343,200	143,300*	486,500*
1953	209,400	117,300*	326,700*
1954	361,900	165,900*	527,800*
<hr/>			
1953	209,400	151,600	361,000
1954	361,900	242,800	604,700

Percent Change 1953 1954  
73%

60%

65%

\* Data uncorrected for absent hens in these cases.

The 1954 spring population was found to be considerably higher than in 1953 and slightly higher than in 1952, being exceeded only by that of 1951.

The species composition of this population for 1953 and 1954 are shown in tables 4 and 5 respectively. The canvasback and shoveler showed the greatest proportional increase, while the Gadwall showed practically no change. Coots showed a considerable increase over 1953.

Table IV. - Species Composition\* of the May, 1953 Waterfowl Population of Southern Manitoba. Aerial Data.

Species	Population Indices		
	Stratum A	Stratum B	Stratum A and B
Pintail	19,200	26,800	46,000 (12.7%)
Mallard	86,900	63,200	150,100 (41.6%)
Baldpate	10,900	2,000	12,900 ( 3.6%)
Shoveler	3,600	-	3,600 ( 1.0%)
Gadwall	6,100	2,000	8,100 ( 2.2%)
B-w. teal	25,300	13,500	38,800 (10.8%)
G-w. teal	-	-	-
Canvasback	9,600	2,000	11,600 ( 3.2%)
Scaup	41,100	36,800	77,900 (21.5%)
Redhead	6,700	5,300	12,000 ( 3.3%)
Ring-necked	-	-	-
Ruddy	-	-	-
Golden-eye	-	-	-
Bufflehead	-	-	-
Scoter	-	-	-
Merganser	-	-	-
Total Ducks	209,400	151,600	361,000 100%
Coots	3,300	1,500	4,800

\* Although the total population index is unaffected, species composition is slightly inflated in favor of the species listed due to the inclusion of unlisted species as "Unidentified."

A later run was made May 29 and 30 of two transects in Stratum A to determine whether or not there was an influx of the later nesting species such as Blue-winged teal and Gadwall. Results showed the species composition unchanged. However, due to the leaves coming out on the trees surrounding potholes, making many on the outer edge of the transect invisible, the total count was below that of the first run. It is recommended that 1/4 mile transects in the Manitoba and southeast Saskatchewan parklands not be run after the appearance of leaves. This was first noticeable on May 20 in 1954.

Table V. - Species Composition of the May 1954 Waterfowl Population of Southern Manitoba, Aerial Data.

Species	Population Indices		
	Stratum A	Stratum B	Strata A and B
Pintail	36,500	26,600	63,100 (10.5%)
Mallard	138,400	116,900	255,300 (42.2%)
Baldpate	9,800	7,500	17,300 (2.9%)
Shoveler	10,400	8,600	19,000 (3.1%)
Gadwall	7,500	900	8,400 (1.4%)
B-w. teal	45,600	22,100	67,700 (11.2%)
G-w. teal	2,900	5,000	7,900 (1.3%)
Scaup*	56,800	37,000	93,000 (15.5%)
Canvasback	26,700	4,100	30,800 (5.1%)
Redhead	13,300	4,500	17,800 (2.9%)
Ring-necked	3,600	500	4,100 (0.7%)
Ruddy	3,600	900	4,500 (0.7%)
Golden-eye	2,300	4,100	6,400 (1.1%)
Bufflehead	3,900	4,100	8,000 (1.3%)
Scoter	300	-	300 (tr.)
Merganser	300	-	300 (tr.)
Total Ducks	361,900	242,800	604,700 100%
Coots	6,900	2,000	8,900

\* Includes scaup in flocks and considered to be migrants. Flock totals were: Stratum A - 36,300; Stratum B - 16,900. These flocks were not assumed to have a 50:50 sex ratio and were not corrected for absent hens.

An indication of the progress of the nesting season is given by the percentage of the observed population consisting of lone males, presumably with hens on the nest.

Table VI indicates that there was a considerable increase over last year in the percentage of lone drakes for the entire two strata. This may be taken to indicate a more healthy situation than was found last year.

Table VI. - The Progress of Early Nesting (Percent of Lone Males in Ducks Observed by Air) in Southern Manitoba.

Year	% Males in Stratum A	% Males in Stratum B	% Males in Strata A and B
1953	29.4%	34.6%	31.6%
1954	39.2%	51.2%	44.1%

Since it appeared that the severe rains in early June might have had an adverse effect on nesting, a small aerial sample of the population was taken on June 8; this sample was taken in district 8 pothole country. Results are shown in Table VII. The theory is that the lone drakes seen had hens still nesting. Ratios are expressed as the percent of males in the total population seen (drakes plus pairs X 2).

Table VII. - Sex Ratios in May and Early June, 1954.

	<u>Mallard</u>		<u>Pintail</u>		<u>B-w. teal</u>	
	<u>No. Ducks</u>	<u>% Males</u>	<u>No. Ducks</u>	<u>% Males</u>	<u>No. Ducks</u>	<u>% Males</u>
% Males in May	2,003	66%	524	67%	968	13%
% Males June 9	247	69%	55	60%	56	54%

These data tend to indicate that the storms of early June had not reduced nesting activities to a marked degree. However, later surveys in July pointed out that the majority of the nesting activity found in May was unsuccessful and very few broods were hatched by July 10. It may be that a normal sex ratio in early June should show a much higher preponderance of males. On the other hand, it is possible that the bulk of the nest loss occurred after June 8.

Production

Table VIII shows both the brood and the potential later brood indices for Strata A and B, including both ducks and coots, for the 1954 survey.

Table VIII. - Brood and Potential Later Brood Indices for Southern Manitoba, 1954.

	<u>Stratum A</u>		<u>Stratum B</u>	<u>Strata A and B</u>
	<u>July 14-18</u>	<u>July 8-Aug. 2</u>	<u>July 21-28</u>	<u>July 14-28</u>
Potential Later Broods	37,858	11,839	17,462	55,320
Broods	13,026	31,023	14,612	27,638
Adult Coots	5,104	2,242	1,069	6,173
Coot Broods	2,818	3,497	3,208	6,026



The first survey July 14 to 18 was made at time that would normally be near the peak of the brood season. However, these data indicate that in 1954 the hatch was just commencing at that time. This is borne out by the age ratio of broods in Stratum A as shown in Table IX.

Table IX . - Age Class Composition of Broods Seen on Ten Transects of Manitoba Stratum A - 1954

	<u>CLASS I</u>	<u>CLASS II</u>	<u>CLASS III</u>
July 14-18 (108 aged broods)	59%	35%	6%
July 28-August 2 (300 aged broods)	40%	41%	19%

During the early survey most of the broods were still in Class I; two weeks later the rate of hatching was tapering off and only 40 percent of the brood were in that class. Table X indicates the species composition for Stratum A throughout the season and includes pairs, broods and potential later broods.

Table X . - Species Composition of Waterfowl Populations, Manitoba Stratum A, 1954.

Species	May Pairs	July 14-18*		July 28-Aug. 2*	
		Broods	Pot. Ltr. Br.	Broods	Pot. Ltr. Br.
Pintail	10.1	20.3	7.1	9.8	11.5
Mallard	38.2	28.8	36.8	43.9	40.3
Baldpate	2.7	0	8.0	2.3	1.1
Shoveler	2.9	0	1.2	0	0
Gadwall	2.1	0	4.2	2.3	5.7
B-w. teal**	12.6	13.6	14.5	16.2	16.1
G-w. teal**	8	-	3.0	-	-
Scaup	15.6	3.4	8.0	8.7	9.2
Canvasback	7.4	16.9	3.3	7.5	2.3
Ring-necked	1.0	0	.3	0	0
Redhead	3.7	15.3	4.4	5.8	1.1
Ruddy	1.0	1.7	8.6	2.9	12.7
Golden-eye	.6	0	.3	0	0
Bufflehead	1.1	0	.3	.6	0
Scoter	.1	0	0	0	0
Merganser	.1	0	0	0	0

\* The same 10 transects serve as a basis for indices during both July runs.

\*\* During the brood season, increasing difficulty was experienced identifying Green-winged teal. Thus the Blue-winged teal column in July actually represents all teal.

During May, care was taken to avoid bias in favor of the species most easily identified by refraining from the identification of birds except under conditions where all species could be identified. This was not done in July, particularly on the second run, due to the greater difficulty in identifying any broods. The fact that broods often occurred in groups led to the tendency to identify the easy ones, or the first ones spotted (usually mallards), and to throw the rest into the "unidentified broods" category. Thus it is quite probable that figure for the more conspicuous species are inflated. This is probably most true of the second run when the clustering of broods was most pronounced. For instance, the mallard makes up an increasing percentage of our recorded population as identification becomes more difficult. At the same time, the Shoveler, which is easily ignored (though not difficult to identify) disappears from the records.

The species composition of broods and potential later broods in Stratum B is shown in table XI.

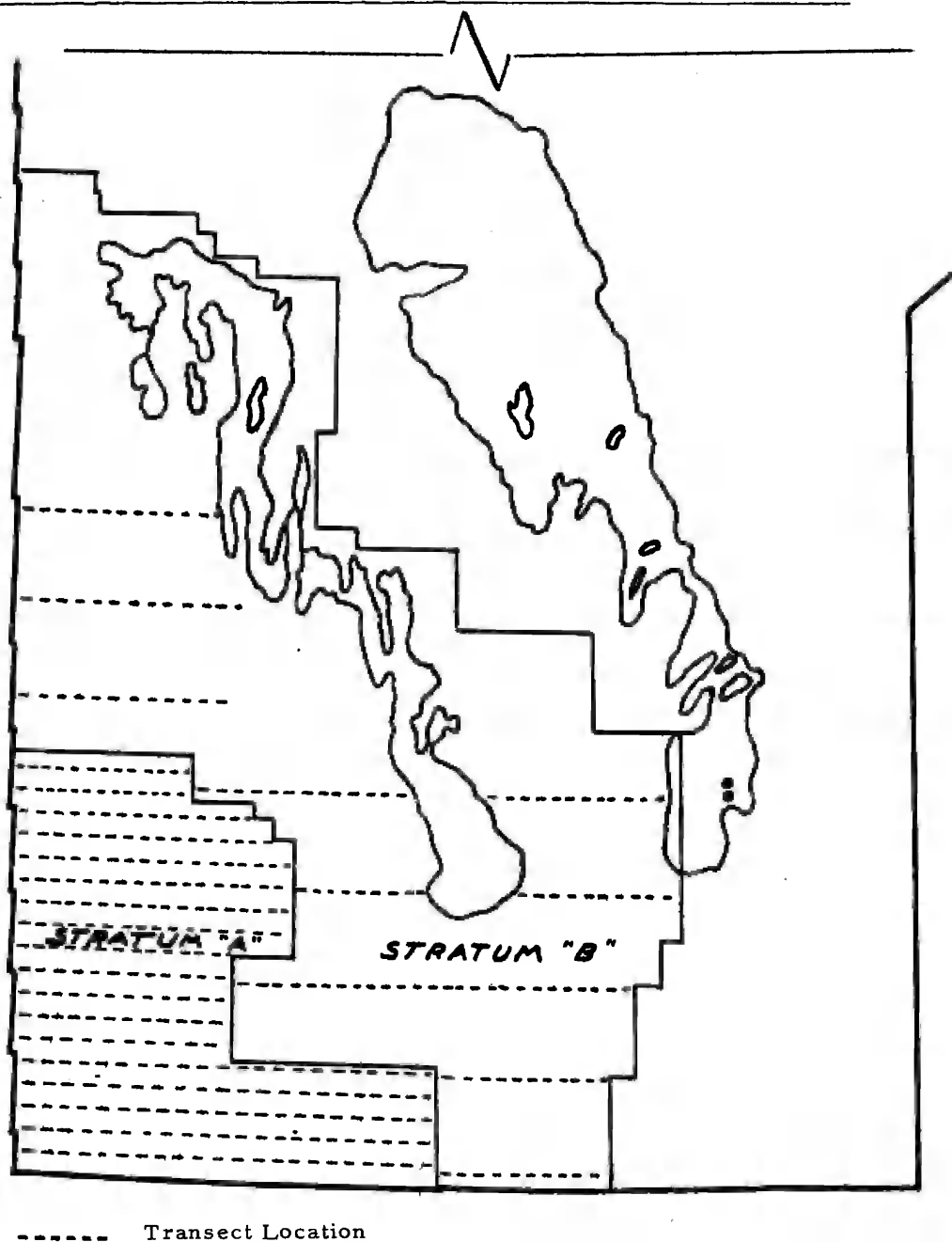
Table XI. - Species Composition of the July Population, Stratum B, 1954 (Expressed as percent of the Total Population).

Species	Broods (25 Identified)	Potential Later Broods (38 Identified)
Pintail		5.3
Mallard	64.0	39.4
Baldpate	4.0	15.8
Shoveler		5.3
Gadwall		7.9
Blue-winged teal	28.0	7.9
Canvasback	4.0	
Redhead		5.3
Ruddy duck		7.9
Golden-eye		2.6
Bufflehead		2.6
Total	100%	100%

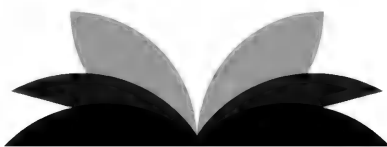
Data for this stratum are few, as indicated by the column headings. However, it is clear that the mallard is the predominate species.

Although production surveys in Stratum B may seem rather fruitless at this time, it is felt that, under drier conditions, the Stratum might have considerable numbers of waterfowl. From the standpoint of future comparisons, it would appear desirable to run surveys there, even at this time.

Figure 1. Aerial Sampling in Stratum "A" and "B" - Southern Manitoba, 1954.



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### Progress of the Season

During May, the birds were much in the open, incubation had started in only a few cases, and it is probable that a relatively high percentage of the birds were visible from the air. The productivity of these birds could only be guessed at with the aid of weather and water data.

During early July, many of these birds had left the breeding grounds or had reverted to non-breeding status. Some had produced broods, while considerable numbers remained on the breeding grounds and were recorded as "potential later broods" (Index 38,118). Those seen greatly exceeded the number of actual broods seen from the air (Index 12,287). The "potential later broods" figure is only an index to reproductive effort taking place at the time. Most of the broods to appear in the few weeks following are in the form of incubated nests, and are not subject to census by any method, except as indicated by hens temporarily off their nests. However, the birds seen in apparent breeding condition were accepted as a valid index to the breeding status of the population as a whole. Considerable work needs to be done before we learn to accurately assess their productivity under all conditions.

In late July, the picture was quite reversed. A considerable number of pairs represented by the "potential later broods" index of 38,118 had been successful in producing broods, while a few had dropped out of the picture as non-breeders or moulters. The brood index of 31,023 was by then nearly three times as large as the "potential later broods" index and 2 1/2 times as large as the brood index of the two weeks earlier. However, even this figure does not, in itself, constitute an index to actual production. Some of the young had been flying for some time and were scattered widely over the country-side no longer recognizable as broods. Others, as indicated by the late July "potential later broods" index, were not yet hatched.

### Conclusions

It is somewhat difficult to compare this year's data with the data of previous years due to the extreme lateness of the season. There is no question but what the entire reproductive effort was at least three weeks later than normal. A comparison of this year's brood index from the second run with indices from previous years, although providing only a rough comparison, might be of value. These data are shown in table XII.

Table XII - Comparison of Aerial Brood Indices, Southern Manitoba, 1950-1954.

Year	Stratum A	Stratum B
1950	19,708	5,148
1951	33,178	4,290
1952	32,141	No Data
1953	7,976	No Data
1954 (1st Run)	13,026	14,612
1954 (2nd Run)	31,023	No Data

It is not believed that much reliance should be placed on these data. Their main weakness is that the figures are not oriented in the season's brood population. It should also be remembered that Stratum B data are based on very few broods and are subject to considerable error. However, the value of the table lies in the indication that production in 1954 was of the same order of magnitude as 1951 and 1952 when it is believed that the brood survey was run somewhere near the peak of the brood season.

Without data on potential later broods from earlier years for comparison, very little more can be said with any degree of certainty. This points up the necessity for learning to make use of some method of orienting brood, and even pair, data in the entire season's reproductive effort. It is becoming increasingly clear that a "normal season" is so rare as to be an abnormality. It appears that the use of data on potential later broods offers the best hope for coping with this problem.

### The Banding of Flightless Young

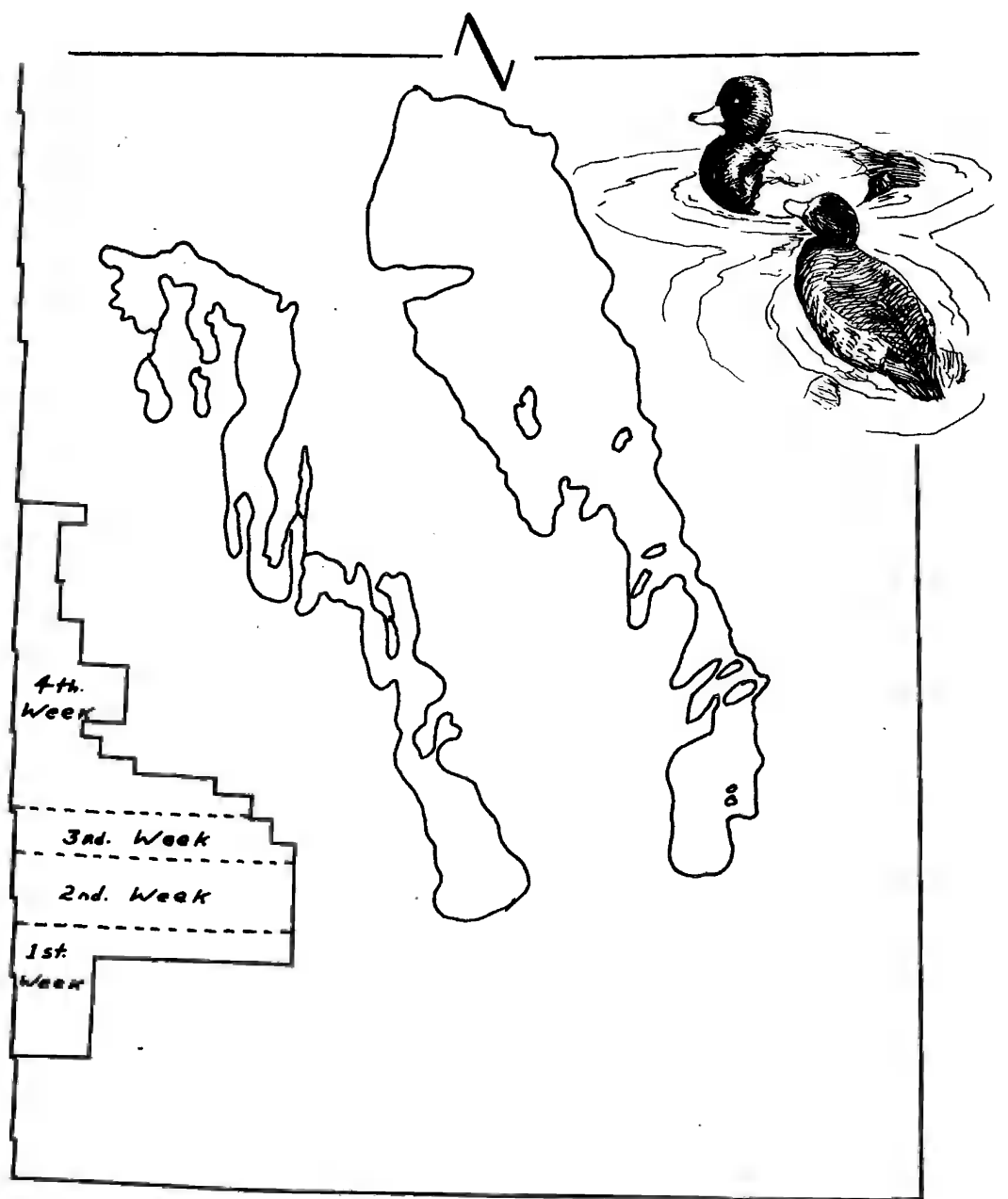
This year considerable emphasis was placed on this phase of the breeding ground survey. For the first time, State personnel were available to assist in the operation.

The season of 1954 created very difficult conditions for banding in the potholes. High water levels enabled broods to escape, either into the brush surrounding the potholes, or overland. Furthermore, the fact that water remained in the smaller, more temporary areas made it unnecessary for the broods to concentrate in what are generally considered "brood areas". In addition, due to the lateness of the breeding season, few broods were hatched by the start of the banding operation on July 10, and the peak of availability of "bandable" broods did not occur until about the time the crews disbanded in mid-August.

Banding drives were conducted at the beginning with emphasis on mallards and coverage was to include all the accessible areas of the Province. However, it soon became evident that populations through a large portion of the Province were so scattered that few would be banded. Accordingly, the plan was modified. Banding was then carried out in the area shown in figure 2 where highest breeding pair populations had been recorded during the spring survey. The emphasis on mallards was also reduced. Effort was distributed, as shown in figure 2, roughly according to the abundance of breeding pairs. Thus there were about equal numbers of pairs in each block covered by a week's work.

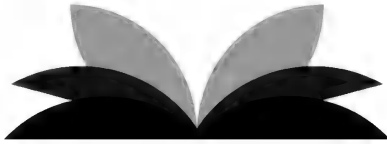
In spite of difficulties, good numbers of birds were banded as shown in Table XIII. Most of these were flightless young.

Figure 2. Pattern of Banding Activity - Manitoba, 1954.



Note: The Fifth Week was Spent in General Coverage of Entire Area.

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Table XIII - Manitoba Banding, 1954.

<u>Species</u>	<u>Number Banded</u>
Blue-winged teal	197
Canvasback	143
Mallard	126
Redhead	106
Lesser scaup	75
Baldpate	51
Shoveler	41
Gadwall	33
Pintail	23
Green-winged teal	21
Ruddy duck	7
Ring-necked	4
Total	827

Appendix

Game Branch Transects - In addition to the surveys reported above, officers of the Manitoba Game Branch conducted ground transects. Many of these provide data which are not directly comparable this year due to shifts in personnel or to differences in timing the running of the transects. The results of a few of the runs are shown below. The figures are given in terms of total ducks, uncorrected for absent hens.

## Transects in Southern Portion of Stratum A:

1951	-	3,006
1952	-	1,980
1953	-	1,661
1954	-	936

## Transects in West Portion of Stratum B:

1953	-	786
1954	-	595

## Delta Marsh\*:

1953	-	2,882
1954	-	2,857

\* According to other records, populations on the Delta Marsh were considerably reduced this past season.

## WATERFOWL BREEDING POPULATION AND PRODUCTION STUDIES

## NEWDAL-ERICKSON STUDY AREA - MANITOBA, 1954

Gerald Pospichal, Barclay M. Cram and Glen Parsons

Introduction

This report covers the complete summer's work on the Newdale-Erickson Study Area from May 1 to August 15, 1954. The methods employed in making the population counts and the production studies were those developed by A. S. Hawkins and William Kiel. Both methods used and the area worked are described in Special Scientific Reports for 1949 and 1951. (Copies of the transect and study pothole descriptions are on file in Minneapolis, Minnesota with the maps of the area.)

The purposes of the study were as follows:

1. To gather data on the spring waterfowl breeding populations and information on production trends, for use by the Regulations Committees of the United States and Canada.
2. To supplement aerial survey findings with emphasis on species composition, age class composition and brood size.
3. Added emphasis was placed on air-ground comparisons of individual potholes. This phase of the study will be covered by Flyway Biologist Evans in his report.
4. Nesting studies were confined to over-water nesters and only on the 120 study areas. The data gathered was not sufficient for any conclusions so it is not covered in this report but remains on file in Minneapolis.
5. To assist in the studies, all transects were completely mapped and all potholes were assigned a number for future work.

The initial run of the study transects was made in the company of A. S. Hawkins who briefed us on the methods of the survey. The breeding population counts and mapping were conducted by Glen Parsons, Manitoba Game Branch, Barclay Cram, Manitoba Game Branch and Gerald Pospichal, U. S. Fish and Wildlife Service. Population studies were continued by Cram and Pospichal. Valuable advice and assistance in conducting the summer's studies and in preparation of reports were rendered by William Kiel, Alex Dzubin, University of Wisconsin, and C. D. Evans, Flyway Biologist, U. S. Fish and Wildlife Service.

### Weather and Water Conditions

Temperatures and precipitation data were taken at four weather stations in or bordering the Newdale-Erickson Study Area. Temperatures for the first ten days in April were generally below normal with precipitation light in the south and southwest to 50 percent above normal in the northwest. Dust storms prevailed in the southern parts. On the 15th of May, temperatures dropped 7 to 17 degrees below normal with freezing rains and up to 8 inches of snow in the southern part of the Province. Precipitation remained about normal to 5 percent above in the southwest to 50 percent above normal in the northwest. Early June rains were heavy in Manitoba and raised water levels in all potholes. During June, precipitation varied from 40 percent to 75 percent above normal and water levels in the 120 study potholes in District 8 on July 22 were approximately the same as when the transect runs were begun in early May. By August 12, as indicated in Table I, twelve percent of the study areas had gone dry as compared to 2 percent on July 25.

Table I. - Water Conditions of 120 Semi-Permanent and Temporary Potholes.

Year	Percent Dry by May 31	Percent Dry by July 25	Percent Dry by Sept. 1
1949	0	0	26
1950	0	0	3
1951	2	19	40
1952	20	45	?
1953	0	0	?
1954	6	2	12 1/2*

\* Percentage dry as of August 12.

### Breeding Population and Phenology

As indicated in Table II, the breeding population for Region 8 was approximately the same as that of the two preceding years with little variation over the past six years. Table III, Species Composition, showed a slight decrease in mallard and scaup with slight increases in canvasback and ruddy.

According to Alex Dzubin, by April 20, approximately 80 percent of the normal May 15 population of mallards and pintails were on territory in the Roseneath Study Area. Potholes in the northern part of Region 8 were still frozen on May 6 with only a few mallards and divers present. All species had arrived in fair numbers and water areas had opened up by the time transect work was begun on May 15.

Table IV is a tabulation of the percent drakes observed on the transects. If we assume a 50-50 sex ratio, the excessive number of pintail drakes observed indicated a very advanced nesting season for this species. Mallards appeared retarded, other species normal as compared to other years. A hatching peak of from 7 days to two

later than normal was anticipated, especially in divers and teal.

### Production

Road Count Observations - Table VI gives a comparison of the species and number of broods observed on the 12 transects from 1950 to 1954. As of July 25 (the data comparable to previous years listed), the 1954 figures showed a reduction in mallard, gadwall, baldpate, redhead, and lesser scaup broods. Canvasback and pintail remained approximately the same with slight increases in blue-winged teal and ruddy ducks. The total number of broods observed at this time was 47 percent below the 1952 total with the greatest loss in mallards which showed a reduction of 76 percent from the 1952 figure and 42 percent from 1953. Though high water may have allowed broods more cover in the flooded emergent vegetation and thus bias the counts, we feel that it could not account entirely for the discrepancy. The beatout data for the 120 study potholes (Table X) closely paralleled the above reductions. A check of the worksheets for the 12 transects revealed 58 pairs and 81 lone females still present on July 25. This could indicate a potential of 139 additional broods.

On the July 25 to August 12 rerun of the 12 transects, the total number of broods observed rose from 153 to 350, Table IX. Mallards jumped to 50 percent below the 1952 base and equal to the 1953 population. However, these figures cannot be compared as this count was completed nearly three weeks later than those of previous years, even though it was estimated that this season was two weeks later than normal, phenologically. The July 25 to August 12 data as compared to that up until July 25 reveals a 50 percent increase in mallard broods, 175 percent in baldpate, 300 in green-winged teal, 186 in blue-winged teal, 166 in shoveler, 325 in redhead, 31 in canvasback, 186 in scaup and 445 in ruddy. In other words, it appears that the survey had been completed before the peak of the hatch in most species probably due to the lateness of the season for divers and loss of earlier nestings in some puddlers. Table IV shows the classes of broods observed by species, road counts, and shows 45 percent of the total broods in Class I and 74 percent of the total broods in Classes I and II on August 12. This total is heavily weighed by normal late hatchers such as redhead, scaup and ruddy though mallards and blue-winged teal are well represented. Table V shows the distribution of the broods. Transects VI to XII are the northernmost and are generally in what is considered better diving-duck ~~habitat~~. Table X reflects in part the data of Table VII. It shows the change in percent species composition of the late hatching divers for the two 1954 runs. Mallards still composed a lower percentage of the total hatch as compared to that of other years but again, the percentages at such a late point in the season were heavily weighed by the late hatching divers.

One conclusion seems to have shown itself above others from this late run of the transects. It appears that in order to gain a truer index of the actual results of the hatch, instead of hypotheses of the potential hatch as gained from early runs and from breeding population counts, a later closing date, as late as is possible, is desirable. On July 25, the picture portrayed by data gathered up until that time was not too rosy. It changed materially in the period from July 25 to August 12 due to late hatching divers and late dabblers. It is apparent that the data gathered during this period is not comparable to any previous data on hand but it may serve as a base for future studies on this area if they are to be continued.

Table VIII indicates the percentage of broods in each age class and was arrived at by road counts on the 12 transects. The first count of 1954 was similar to 1953 in the large percentage of broods in Classes I and II. The years 1950, 1951 and 1952 showed a better division of broods into the three age groups. 1954 shows the late season with 63 percent of the broods in the youngest age class on July 25. This figure had dropped to 46 percent on August 12.

Study Pothole Beatouts - Table X lists the number of broods and the percent species composition as observed on the 120 study potholes. These were counted in "complete beatouts" during July and again in August. The data gathered from the study areas closely paralleled that of the road counts. Up until July 25, total broods observed were 58 percent below the 1952 population. Age classes closely compared with 1953 with 88 percent of the broods in Classes I and II on July 25. In the August beatout of these same areas, the total broods counted jumped from 44 to 98 or an increase of 123 percent. (128 percent from road counts, Table VII.) In species composition, Table X, mallards were below 1952 and 1953. A numerical increase in mallards appeared in the August beatout but again, the species composition was weighted by the diver hatch. These August data could not be compared to any available for previous years. It is probable that all mallard broods were not counted, even in a complete beatout, because of this species characteristic to "sit tight" or "leave" the pothole during a beatout. The high water levels, which made shore cover more available to the broods, may also have influenced the counts but it is felt that these factors alone could account for such a discrepancy in this year's figures as compared to previous data. The information gathered on the 120 study areas is remarkably similar to that gathered on the road counts of all the transects, both for the July and August counts.

Coot showed an increase throughout the area of approximately 50 percent. Dzubin also reported a 50 percent increase in coot on the Roseneath Study Area.

Periodic Counts - Table II is a tabulation of four road counts made on the same transect at different hours during the day. The day itself was average; clear to partly cloudy, slight wind which built up during the day and abated toward evening, and average seasonal temperature. It again indicates that the optimum periods for making road counts for duck broods are the early morning and late evening hours. The mid-day hours were thus devoted to beatouts of the study areas as time was not an element during a beatout. Coot appeared to be equally active at all hours of the day with no marked preferences for any special period.

### Summary and Conclusions

These are our conclusions and impressions from field observations and data gathered during the summer's work in District 8.

1. Water levels were sufficiently high to last throughout the brood season. The rises from June rains appeared to have caused considerable nest losses in the dabblers.

2. Cover was good for both nesting and rearing of broods.
3. Production appeared below that of previous years as of July 25. Mallard broods were 76 percent below 1952 and 47 percent below 1953 as of this date. By August 12, all species showed a remarkable increase in numbers of broods, 120 percent above the July 25 figure. Unfortunately, there were no August data for previous years to make a comparison.
4. The season was phenologically at least two weeks later than normal for most species. Pintails appeared about normal.
5. Early brood sizes appeared slightly smaller than previous years, those of the divers during the August counts appeared about average.
6. Coot showed an increase of about 50 percent throughout District 8.
7. It is felt that an extended survey period for the ground studies, through August 6, at least, would enable these crews to present a more accurate figure for the production index.

Table II. - Total Breeding Population, Corrected\*.

Species	May 14 - June 6 1949	May 26 - June 1 1950	May 15 - June 2 1951	May 6 - May 29 1952	May 15 - May 28 1953	May 15 - June 2 1954
Mallard	1436	1424	1188	1614	1596	1468
Gadwall	232	200	174	142	70	78
Baldpate	398	384	320	286	288	308
Pintail	420	404	476	436	486	536
G-w. teal	206	234	248	230	102	140
B-w. teal	1062	1428	1058	824	896	898
Shoveler	232	248	228	134	170	172
Redhead	256	300	200	162	224	190
Canvasback	408	450	352	332	276	374
Lesser scaup	540	628	622	692	704	612
Ruddy duck	160	524	178	66	128	172
Misc.	94	168	150	102	92	76
Total	5444	6392	5194	5020	5032	5024

\* Corrected population = Number of males X 2

Table III. - Species Composition (Percent).

Species	1949	1950	1951	1952	1953	1954
Mallard	26	22	23	32	32	29
Gadwall	4	3	3	3	1	1
Baldpate	7	6	6	6	6	6
Pintail	8	6	9	9	10	11
G-w. teal	4	4	5	5	2	3
B-w. teal	20	22	20	16	18	18
Shoveler	4	4	4	3	3	3
Redhead	5	5	4	3	5	3
Canvasback	7	7	7	7	6	7.5
Lesser scaup	10	10	12	14	14	12
Ruddy duck	3	8	3	1	3	5
Misc.	2	3	3	2	2	1.5

Table IV. - Percent Males.

Species	1949	1950	1951	1952	1953	1954
Mallard	74	74	82	78	75	63
Gadwall	53	53	56	53	54	52
Baldpate	55	57	60	56	55	59
Pintail	77	71	80	79	72	95
G-w. teal	63	63	79	73	57	65
B-w. teal	57	57	66	61	55	59
Shoveler	58	59	69	64	54	60
Redhead	55	54	63	56	57	56
Canvasback	61	70	84	66	57	71
Lesser scaup	59	61	61	58	59	59
Ruddy duck	63	64	69	59	65	68
Misc.	61	60	65	54	58	63

Table V. - Number of Broods by Age Class and Species, Road Count.

Species	Age Class						Broody hen	
	I		II		III			
	7/25	8/12	7/25	8/12	7/25	8/12	7/25	8/12
Mallard	10	14	10	8	6	29	1	
Gadwall	-	1	-	1	-	-	-	
Baldpate	4	8	-	2	-	1		
Pintail	-	-	5	-	2	11	1	
G-w. teal	1	2	-	-	-	2		
B-w. teal	14	12	-	12	-	19	1	
Shoveler	3	-	-	2	-	6		
Redhead	4	13	-	4	-	-		
Canvasback	24	6	31	46	2	23		
Scaup	15	39	-	4	-	-		
Ruddy duck	13	55	-	16	-	-		
Misc.	6	10	-	3	-	1		
Total	94	160	46	98	10	92	3	6

Table VI. - Number of Broods by Age Class and Transect, Road Count.

Transect	I		II		III		Broody Hen	
	7/25	8/12	7/25	8/12	7/25	8/12	7/25	8/12
I	1	9	4	6	1	3	1	1
II	7	10	6	15	-	7	-	-
III	3	8	1	3	2	7	-	-
IV	6	17	1	9	0	7	-	-
V	10	8	6	9	2	12	-	4
VI	4	16	0	8	0	4	1	-
VII	11	5	3	11	1	8	-	-
VIII	7	22	1	5	2	11	-	-
IX	2	5	3	2	0	7	-	-
X	1	17	1	6	1	4	-	-
XI	28	18	8	9	0	9	-	-
XII	14	25	12	15	1	13	1	-
Total	94	160	46	98	10	92	3	6



Table VII. - Roadcount Brood Survey - 12 Transects (Early Morning - Late Afternoon).

Species	Number of Broods				1954	
	1950	1951	1952	1953	7/25	8/12
Mallard	50	91	113	50	27	51
Gadwall	5	3	4	3	0	2
Baldpate	12	26	13	13	4	11
Pintail	14	29	27	11	8	11
G-w. teal	3	6	4	2	1	4
B-w. teal	56	49	28	10	15	43
Shoveler	9	11	6	0	3	8
Redhead	17	20	12	20	4	17
Canvasback	52	73	46	64	57	75
Lesser scaup	7	20	5	26	15	43
Ruddy duck	32	24	10	10	13	71
Misc.	30	32	19	23	6	14
Total	287	384	287	232	153	350

Table VIII. - Species Composition, Road Count.

Species	1950	1951	1952	1953	1954	
					7/25	8/12
Mallard	17	24	39	22	17	14.5
Gadwall	2	1	1	1	0	.5
Baldpate	4	7	5	6	3	3.1
Pintail	5	8	9	5	5	3.1
G-w. teal	1	2	1	1	1	1.1
B-w. teal	20	13	10	4	10	12.2
Shoveler	3	3	2	0	2	2.3
Redhead	6	5	4	9	3	4.8
Canvasback	18	19	16	28	37	21.4
Lesser scaup	2	5	2	11	7	12.2
Ruddy duck	11	6	4	4	8	20.2
Misc.	11	8	7	10	6	4.4

Table IX. - Percent of B broods in each Age Class, Road Count.

Age Class	1950	1951	1952	1953	1954	
					7/25	8/12
I	49	47	39	64	63	46
II	19	23	22	17	31	28
III	32	31	39	18	6	26
Total Aged	283	379	282	229	150	350

Table X. - Broods on the 120 Study Potholes.

Species	7/8 - 23/52		7/5 - 23/53		7/12 - 23/54		7/25 - 8/12/54	
	Sp. Comp.		Sp. Comp.		Sp. Comp.		Sp. Comp.	
	Birds	Percent	Birds	Percent	Birds	Percent	Birds	Percent
Mallard	35	34	43	46	11	25	27	27
Gadwall	1	1	0	0	1	2	1	1
Baldpate	4	4	4	4	0	0	5	5
Pintail	10	10	7	8	6	14	4	4
G-w. teal	7	7	2	2	0	0	2	2
B-w. teal	16	15	10	11	6	14	18	18
Shoveler	4	4	5	5	1	2	7	7
Redhead	3	3	7	8	1	2	0	0
Canvasback	7	7	11	12	9	21	10	10
Lesser scaup	5	5	2	2	4	9	2	2
Ruddy	6	6	0	0	1	2	18	18
Others	6	6	2	2	4	9	4	4
Total	104		93		44		98	

Age Class	No. Birds	%	No. Birds	%	No. Birds	%	No. Birds	%
I	32	36	39	60	22	57	28	39
II	14	16	12	19	12	31	16	22
III	44	49	14	22	5	13	28	39

	90 plus 14 unaged	65 plus 28 unaged	39 plus 5 unaged	72 plus 26 unaged
Trend	***	-11% of 1952	58% of 1952	Not comparable to 1952

Table XI. - Periodic Brood Counts on Transect Eight.

Species	I 5:15 - 7:30 am	II 10:00 - 12:00 am	III 2:00 pm - 4:05 pm	IV 5:45 pm - 7:30 pm
Mallard	5	4	4	2
Gadwall	1	0	1	1
Baldpate	1	2	2	2
Pintail	-	0	1	2
G-w. teal	0	0	0	0
B-w. teal	7	5	6	9
Shoveler	3	1	2	3
Redhead	0	0	1	1
Canvasback	15	7	8	6
Scaup	13	13	7	6
Ruddy	12	4	10	13
Misc.	1	1	0	0
Total	59	37	42	45
Coot	33	35	34	37

## POPULATION AND PRODUCTION TRENDS ON THE DELTA MARSHES OF SOUTH-CENTRAL MANITOBA, 1954

S. T. Dillon

### Introduction

Aerial estimates of the Delta Marsh waterfowl population have been made since 1947, primarily by U.S. Fish and Wildlife Service and Delta Research Station personnel. It has been only during the past two years that attempts have been made to estimate this population at regular intervals.

### Methods

An aerial survey system consisting of a set of seven, east-west transects, falling along section lines and covering that portion of the Delta Marsh from Clandeboye Bay to the Delta road was established. These transects total 44 linear miles. A strip one-eighth mile on each side of the aircraft was considered the zone of observation thus providing a 25 percent sample of approximately 44 square miles of marsh. When only one person is observing the sample size is reduced to 12.5 percent. This survey system is essentially like that initiated in 1948 by A. S. Hawkins and D. L. Spencer of the U.S. Fish and Wildlife Service.

In 1953 I flew entirely with U.S. Fish and Wildlife Service or Manitoba Government Air Service personnel. This year, to maintain regularity of observation, I relied upon rental aircraft supplied by the Portage Flying Club of Portage La Prairie, Manitoba. In addition I made two flights with Charles Evans (Fish and Wildlife Service) and two flights with the Manitoba Government Air Service. Information from another MGAS flight was made available to me by J. L. Howard and Nolan Perret of the Manitoba Game Branch.

A dictaphone was used to record species and numbers of waterfowl seen on all flights with the U.S. Fish and Wildlife Service. Otherwise I employed a system of hand tally.

Marsh-level counts were made on two occasions (July 26 to July 30, 1954 and August 5 to August 11, 1954) using a freighter canoe powered by a Johnson, 5 h.p. outboard motor. Either George Shand or Ralph Hancock of the Manitoba Game Branch operated the motor while I kept records. A system of 19 shoreline transects established by the Manitoba Game Branch constituted the survey. These transects cover an estimated 35 miles of shoreline which represents a 16 percent sample of the total shoreline. I cannot vouch for these two statistics as I do not know how they were obtained.



It is evident that population fluctuations during the summer of 1954 were quite erratic although the general trend of a pre-breeding high to a breeding low to a post-breeding high is discernable. These fluctuations can be explained, in part at least, by the shifting of concentrations of molting baldpates, the utilization of newly accessible molting waterfowl and conflicts with banding operations.

The somewhat higher breeding population of 1954 was apparently due to a substantially increased redhead population (76.6 percent increase over 1953) and slightly higher numbers of canvasback and mallards.

### Production

The results of the two brood counts conducted with outboard motor and canoe are as follows:

July 26 - 30, 1954			August 5 - 11, 1954		
Age Class	Total Broods	Total Young	Age Class	Total Broods	Total Young
I (a-b)	7	36	I (a-b)	6	35
II (b)	5	20	II (b-c)	3	19
III	-	-	III	-	-
Total	12	56	Total	9	54

Calculated production combining elements of the second survey not seen on the first with the first:

Broods		Young
17	Combined Surveys	83
X6	Conversion Factor	X 6
102		498
+4	Seen off Transect	+24
106		522

Average Brood Size = 4.92

Data from previous years are available (see Table II), but they are probably not directly comparable (with the exception of 1953) because of inconsistent sampling methods.

Table II. - Aerial and Marsh - level Brood Data - Delta Marsh.

Year	Date	Method	Total Broods	Average Brood Size
1954	8/16	Air	80	-
1954	7/26-8/11	Canoe	106	4.92
1953	8/2	Air	132	4.37
1950	7/31	Canoe	179	5.43
1949	7/9	Canoe	106	5.97
1948	7/19	Canoe	72	6.98
1948	7/19	Air	96	-
1947	7/25	Canoe	167 (81?)	5.86
1947	7/25	Air	196	-

A comparison of 1953 and 1954 aerial data indicates that production was down some 39.4 percent. Comparing canoe and aerial data, production was down 19.7 percent. That production on the Delta Marsh was down is certain. Just how much is uncertain.

#### Summary

Waterfowl population and production trends were studied over 44 square miles of prairie marsh in south-central Manitoba.

An increased breeding population in 1954 experienced a decrease in production as compared with 1953.

Phenologically the 1954 season was from ten days to two weeks later than 1953.

## WATERFOWL PRODUCTION - ROSENEATH STUDY AREA, 1954

Alex Dzubin

### Introduction

The Roseneath Study Area is a typical block of "pothole-agricultural" waterfowl breeding habitat, situated nine miles south of Minnedosa, Manitoba. The study block comprises one and a half sections of land on which are found one hundred eighty-eight potholes of various sizes. Most of the small sloughs are less than an acre in size and have cattail, bulrush, whitetop, and sedges as the main dominants.

A study of the production, biology, and breeding behaviour has been carried out since 1952. Evans (in Waterfowl Populations and Breeding Conditions - Summer 1949, Crissey *et al* pp. 71-75 had previously studied brood movements here, gives a map of the region.

### Weather and Water Conditions

Spring break-up was late this year and snow was common until May 15. General inclement weather with excess precipitation prevailed during May and June. The breeding season in the pothole region about Minnedosa appeared to be a week or ten days later, phenologically, than last year. In 1953, the breeding season was also a week or ten days later than 1952.

Water conditions throughout the pothole region have remained excellent during the breeding and brood seasons. A good winter snowfall plus early spring rains ensured a plentiful supply of water for pairs. Sufficient brood potholes were always available during the summer. The rainfall at Roseneath and several surrounding stations was 40 to 60 percent heavier, during June and May, than the average precipitation for the region. As previously indicated, upland nesting species had many of their nests flooded.

### Breeding Pair Census

Table I shows the number of breeding pairs and broods per square mile, on the Roseneath Study Area for 1952, 1953, and 1954. Small yearly fluctuations have occurred in a few of the species shown but generally speaking the number of breeding pairs has remained relatively stable. Blue-winged teal, baldpate, pintail, and ruddy duck numbers show a small increase in 1954. The total number of pairs seen was higher in 1954 when compared to either 1952 or 1953.

A bi-weekly census was carried out on the area during May and June. Than a certain number of pairs were assigned to any one quarter section. The maximum number of pairs observed after May 15, on any one census, was used in all subsequent productivity comparisons.



### Brood Census

Table I also shows the number of broods produced yearly. The number of broods per square mile in 1954 took a very severe drop when the total brood figure is compared to 1952 or 1953. Only 30.7 brood per square mile were noted in 1954 as compared to 60.2 in 1953 and 49.2 in 1952. The 1954 figures indicate a reduction of 49 percent in the number of broods per square mile, as compared to the previous year. The major drop in brood numbers has occurred in the upland nesting species. No appreciable drop was noted in the diver production as the number of broods remained almost the same as last year. However, dabbler brood Numbers were reduced more than 60 percent from last year.

Rising water levels, rain, snow, predators, and the general inclement weather undoubtedly caused a great deal of nest destruction, which was in turn reflected in end production. Many dabbler nests were flooded during the heavy June rains, while divers were not affected by rising water levels.

Three complete brood census were carried out on the area, one on July 12, the second on August 5, and the last on August 16. The "beat out" method was used, wherein two men walked through all the emergent vegetation of the pothole and flushed all broods. Flushed and feigning females were also recorded as broods. There are certain inherent faults in this method but it is the most efficient of any and has been used successfully for three years. Duplicate broods were removed from the final figure in the second and third census after a method described by Blankenship et al. (1953 - Techniques for brood production studies).

### Summary and Outlook

1. The number of breeding pairs was somewhat higher in 1954 than in 1953.
2. The number of broods produced in 1954 was 49 percent less than in 1953. Dabbler production suffered most.
3. The season was about a week to ten days later, phenologically, than last year.

### Acknowledgments

The author wishes to express his sincere thanks to the Delta Waterfowl Research Station for financial and other aid, to the National Research Council of Canada for aid in buying boom traps, and to the members of the Manitoba Game and Fisheries Branch and U. S. Fish and Wildlife Service for help in the field.

Table I. - Number of Breeding Pairs and Broods Per Square Mile on the  
Roseneath Study Area, 1952, 1953, and 1954.

Species	Pairs Per Square Mile			Broods Per Square Mile		
	1952	1953	1954	1952	1953	1954
Mallard	36.0	32.7	27.3	13.3	16.7	6.0
B-w. teal	20.7	18.0	23.3	14.0	15.3	5.3
Pintail	7.3	4.0	8.0	2.0	2.0	.7
Baldpate	8.0	8.7	10.0	4.0	2.7	.7
Shoveler	2.7	2.0	3.3	.7	2.7	1.3
G-w. teal	3.3	2.0	3.3	1.3	.7	.7
Canvasback	8.0	6.7	6.7	5.3	8.0	5.3
Gadwall	2.0	2.0	1.3	.7	.7	-
Redhead	2.7	6.7	4.0	2.7	4.0	4.7
Lesser Scaup	.7	1.3	1.5	-	.7	-
Ruddy duck	2.7	6.7	9.3	4.7	6.0	5.3
Unidentified	-	-	-	.7	.7	.7
Totals	94.1	90.8	97.8	49.4	60.2	30.7

WATERFOWL BREEDING GROUND SURVEYS OF DUCKS UNLIMITED (CANADA)  
IN ALBERTA, SASKATCHEWAN AND MANITOBA

William G. Leitch

This report covers the ground transects run by Ducks Unlimited fieldmen in the three prairie provinces and gives results obtained on special study areas.

Transects were run the third week of May to record breeding pairs and again in mid July for information on water conditions.

To conserve space species breakdowns are given only on a provincial level but are available for all smaller units.

Areas for more intensive study are located at Strathmore and Brooks in Alberta and at the Caron Potholes and Southey in Saskatchewan. The Alberta areas are a cooperative project with the U. S. Fish and Wildlife Service while those in Saskatchewan are a Ducks Unlimited responsibility.

Data obtained from Keeman Co-operators and the annual aerial survey have been published in the Duckological which is issued monthly while the waterfowl are in Canada.

Results of Transects

Alberta

Area - Calgary South (Western "Short Grass" Prairies)

(Via: Strathmore, Mossleigh, Macleod, Pincher Creek, Waterton, Cardston, Macleod, Kepp, Vulcan, Milo, Grants, Hussar.)

	1951	1952	1953	1954
Size of sample - square miles	43	40	43	43
Breeding pairs per square mile - May	15.2	22.4	40.6	32.9
Ponds per square mile - May	4.9	6.6	7.3	9.1
No. of water areas per square mile on July 15 estimated to last all season	3.3	2.7	6.5	2.9

Area - Calgary North (Western "Short Grass" Prairies, from Endiang Aspen Parkland)

(Via: Husser, Morrin Watt, Endiang, Ranching, Big Valley, Stettler, Delburne, Innisfail, Olds, Sundre, Radnor, Calgary.)

	1951	1952	1953	1954
Size of sample - square miles	40	39	40	40
Breeding pairs per square mile - May	15.1	20.4	28.6	41.3
Number of water areas per sq. mi. - May	7.8	10.8	12	21.6
No. of water areas per sq. mi. on July 15 estimated to last all season	6.1	3.5	9.7	9.1

Area - Tilley South (Eastern "Short Grass" Prairies)

(Via: Brooks, Taber, Lethbridge, Del Bonita, Pakowki, Seven Persons, Medicine Hat, Tilley.)

Size of sample - square miles	36	36	38	38
Breeding pairs per square mile - May	11.9	18	25.1	28.1
Number of water areas per sq. mile - May	3.6	7.4	7.8	4.3
No. of water areas per sq. mi. on July 15 estimated to last all season	2.5	2.6	2.7	1.1

Area - Tilley Northeast (Eastern "Short Grass" Prairies)

(Via: Suffield, Jenner, Empress, Cereal and Hanna to Tilley.)

Size of Sample - square miles	38	35	37	37
Breeding pairs per square mile - May	33.1	30.6	29.9	30.7
Number of water areas per sq. mile - May	4.9	9.5	10.0	5.9
No. of water areas per square mile on July 15 estimated to last all season	3.7	4.0	4.0	2.3

Area - Hanna Northeast (Aspen Parklands)

(Via: Cereal, Consort, Czar, Killam, Hanna.)

Size of sample - square miles	29	26	28	28
Breeding pairs per square mile - May	42.9	22.1	26.7	23.8
Number of water areas per sq. mile - May	7.7	13.0	16.4	8.2
No. of water areas per sq. mil on July 15 estimated to last all season	6.3	7.4	9.4	4.4

Area - Tofield Southeast (Aspen Parklands)

(Via: Tofield, Wainwright, Vermilion, Two Hills, Ranfurley, Hilliard, Tofield.)

	1951	1952	1953	1954
Size of sample - square miles	34	34	37	36
Breeding pairs per square mile - May	5.9	8.2	12.6	12.1
Number of water areas per sq. mile - May	-	-	9.8	10.9
No. of water areas per sq. mil on July 15 estimated to last all season	-	-	4.7	5.1

Area - Tofield Southwest (Aspen Parklands)

(Via: Tofield, Camrose, Bashaw, Ponoka, Thorsby, Leduc, New Serepta.)

Size of sample - square miles	27	27	26	29
Breeding pairs per square mile - May	3.0	4.5	11.1	14.5
Number of water areas per sq. mile - May	-	-	15.6	10.8
No. of water areas per sq. mi. on July 15 estimated to last all season	-	-	8.3	7.9

Area - Tofield North (Aspen Forest)

(Via: Mundare, Willingdon, Kaleland, Lafond, Ashmont, Vimy, Edmonton.)

Size of sample - square miles	26	24	25	24
Breeding pairs per square mile	3.3	5	9.9	7.0
Number of water areas per sq. mile - May	-	-	11.3	7.6
No. of water areas per sq. mile on July 15 estimated to last all season	-	-	2.6	3.2

Summary

Total Provincial sample - square miles	273	261	274	275
Breeding pairs per square mile	16.4	17.3	24.5	25.3
Water areas per square mile - May			10.9	10.0
Water areas per square mile on July 15 estimated to last all season			5.9	4.4

Species CompositionAlberta

Species	1952	1953	1954
Pintail	1989	2586	2125
Mallard	1014	1712	1653
Blue-winged teal	355	544	995
Shoveler	357	510	722
Lesser scaup	291	449	564
Baldpate	249	368	368
Gadwall	96	99	176
Redhead	68	138	146
Canvasback	35	154	78
Green-winged teal	42	60	58
Ruddy	13	53	48
Bufflehead	1	9	11
Golden-eye	-	3	1
Cinnamon teal	1	1	1
White-winged scoter	2	-	-
Ring-necked	1	-	-
Wood duck	-	-	1
Unidentified	5	20	30
	4519	6715	6988

The over-all Alberta population in the area sampled by the transects shows an increase of 4 percent which lying well within the margin of error is best expressed as unchanged from 1953 but above that of 1952. The most conspicuous feature was a shift in population from the drier southwest and east central parts of the province to the exceptional well watered west central section.

Pintails decreased from the previous year, mallards remained about the same. Gains by blue-winged teal and shovelers compensated for losses by other species.

The July 15 transects showed that abundant early season rains had maintained surface waters and that production of the duck crop was assured. Above normal precipitation during the remainder of the summer guaranteed this production and except perhaps for a few localized districts the whole area went into winter with water levels high and in ideal condition for 1955.

## Saskatchewan

### Area - Swift Current Southwest (Eastern "Short Grass" Prairies)

(Bounded on the north by No. 1 Highway, east by No. 4 Highway, and on the south and west by the U. S. and Alberta borders.)

	1951	1952	1953	1954
Size of sample - square miles	14	14	14	14
Breeding pairs per square mile - May	8.1	27.5	33.9	38.0
Number of water areas per sq. mi. - May	11.1	9.5	10.5	9.1
No. of water areas per sq. mi. on July 15 estimated to last all season	2.4	5.8	3.6	4.5

### Area - Swift Current north to South Saskatchewan River (Western Section - Mixed Prairie)

(Bounded south by No. 1 Highway, east by No. 4 Highway, West by Alberta border, and north by the South Saskatchewan River.)

Size of sample - square miles	20	20	20	20
Breeding pairs per square mile - May	17	43.4	57.7	41.6
Number of water areas per sq. mi. - May	15.3	11.2	10.1	5.1
No. of water areas per sq. mi. on July 15 estimated to last all season	4.7	4.4	4.1	2.8

### Area - North of South Saskatchewan River west of Highway No. 4 (Western Section - Mixed Prairie)

(Bounded by the South Saskatchewan River on the south, on the north by Township 34, on the east by Highway No. 4, and on the west by the Alberta border.)

	1951	1952	1953 Comp. to 1952	1953 new Trans.	1954
Size of sample - square miles	16	16	15	32	32
No. of breeding pairs per sq. mi. - May	13.5	36	64.2	52.0	36.8
No. of water areas per sq. mi. - May	15.1	15.6	13.4	13.4	4.2
No. of water areas per sq. mi. on July 15 estimated to last all season	5.2	5.4	4.3	6.0	1.7

### Area - North of No. 1 Highway, east of Highway No. 4 (Swift Current Area) (Western Section - Mixed Prairie)

(Bounded by No. 1 Highway on the south, No. 4 on the west, on the north by Township 34, and on the east by Range 1, west of 3rd.)

	1951	1952	1953	1954
Size of sample - square miles	25	23	25	25
Number of breeding pairs per sq. mi. - May	11.2	39.3	55.5	34.5
Number of water areas per sq. mi. - May	14.5	15.6	14.5	7.1
No. of water areas per sq. mi. on July 15 estimated to last all season	5.7	4.8	5.2	4.5

Area - Swift Current East (Western Section - Mixed Prairie)

(Bounded by Highway No. 1 on the north, on the west by No. 4 Highway, on the east by Range 1, west of 3rd, and on the south by the United States Border.)

	1951	1952	1953	1954
Size of sample - square miles	11	11	11	11
Breeding pairs per square mile - May	11.2	38.7	41.4	41.7
Number of water areas per sq. mile - May	11.7	14.9	12.8	8.5
No. of water areas per square mile on July 15 estimated to last all season	5.1	4.6	6.6	5.2

Area - Wynyard Southwest. Brown Soils (Western Section Mixed Prairie).

(Missouri Couteau, Moose Jaw to Ogema via Highways 2 and 13.)

Size of sample - square miles	Not	10	10	10
Breeding pairs per square mile - May	comparable	49.2	61.8	55.6
Number of water areas per sq. mile - May	with	19.7	10.0	8.6
No. of water areas per square mile on July 15 estimated to last all season	subsequent years	6.5	8.8	7.3

Area - Wynyard Southwest. Dark Brown Soils (Eastern Section of Mixed Prairie).

(Bounded on the south by U. S. Border, on west by Moose Jaw-Radville Railroad and Highway No. 11 Moose Jaw to Saskatoon on the east by Highways Nos. 9 and 16 to Regina and No. 6 from Regina north to No. 14, and on the north by Highway No. 14).

Size of sample - square miles	not	30	30	30
Breeding pairs per square mile - May	comparable	18.1	17.4	16.4
Number of water areas per square mile - May	with	14.8	13.1	8.2
No. of water areas per sq. mi. on July 15 estimated to last all season	subsequent years	5.3	7.2	6.1

Area - Wynyard Southeast. Black Soils (Aspen Parkland).

(Bounded on the south by the U. S. Border, on the west by Highways No. 9 and 16 to Regina and by No. 6 north to junction with No. 14, on the east by the Manitoba Border to Kamsack, on the north by Highway No. 5 to Watson.)

Size of sample - square miles	Not	25	25	25
Breeding pairs per square mile - May	comparable	10.2	10.8	14.8
Number of water areas per sq. mile - May	with	16.1	19.7	17.0
No. of water areas per sq. mile on July 15 estimated to last all season	subsequent years	6.2	10.4	19.8



Area - Wynyard North. Degraded Black and Grey Soils. (Mixed Aspen and Coniferous Forest.)

(Via: Highways Nos. 2 and 55 Prince Albert to White Fox - south to Wadena via Highway No. 35.)

	1951	1952	1953	1954
Size of sample - square miles	Not	10	10	10
Breeding pairs per square mile - May	comparable	4.0	3.7	5.1
Number of water areas per sq. mi. - May	with	5.7	5.5	6.3
No. of water areas per sq. mi. on July 15	subsequent			
estimated to last all season	years	4.0	5.3	5.3

Summary

Total Provincial sample - square miles	161	177	177
Breeding pairs per square mile	22.0	37.2	30.1
Water areas per square mile - May	21.3	12.9	8.2
Water areas per square mile on July 15			
estimated to last all season	5.2	6.4	6.9

Species Composition

Saskatchewan

Species	1952	1953	1954
Pintail	Not	2242	1521
Mallard		1796	1659
Blue-winged teal	Comparable	671	611
Shoveler		634	490
Baldpate	with	455	312
Gadwall		205	269
Lesser scaup	Subsequent	193	207
Canvasback		153	106
Redhead	Years	103	77
Green-winged teal		84	52
Ruddy		46	29
Unidentified		-	2
		6582	5335

The Saskatchewan transects show a decrease in breeding pairs from 1953 of approximately 18 percent. This is accounted for almost entirely by the decline in pintails in the western half of the province. The population in the eastern half shows no change from the previous year. While reduced from 1953 the waterfowl population continues at a high level and still considerably in excess of 1952.

May transects showed water areas to be about a third less than 1953. However, by the July 15 transects, heavy rains had maintained and increased water areas so that there were more available at that date than the previous year. Above normal precipitation continued and freeze up came with the country virtually in a spring condition. This was particularly true of eastern Saskatchewan where many stations have reported precipitation between 9 and 12 inches in excess of normal.

## BROOKS AREA - ALBERTA

(Area 1 of the U. S. Fish and Wildlife Service)

Fred Sharp

This study area extends along one side of the old No. 1 Highway from the town of Brooks to Suffield and totals 4.8 square miles. It is a cooperative undertaking by Ducks Unlimited and the U. S. Fish and Wildlife Service.

Counts of breeding pairs were made in early spring and water gauges established but the area was dry except for irrigation water by August 4.

A full report by Allen G. Smith is available elsewhere in this publication under "Waterfowl Breeding Ground Surveys of Special Study Areas."

## STRATHMORE AREA - ALBERTA

(Area 2 of the U. S. Fish and Wildlife Service)

George Freeman

Weekly runs of this 26 mile transect (3.1 square miles) were made from May 3 to June 25 by George Freeman of Ducks Unlimited. Nest searches were also made and brood counts at the end of June and July.

The results of this work and that of the U. S. Fish and Wildlife Service in the area are fully reported by Allen G. Smith under the section "Waterfowl Breeding Ground Surveys of Special Study Areas" in this publication.

## CARON POTHOLE STUDY AREA - ALBERTA

W. G. Leitch

The study area was fully described in the Special Scientific Report - Wildlife No. 25, "Waterfowl Populations and Breeding Conditions Summer 1953" and will not be repeated here.

A localized drought persisting through the late summer of 1953 and the following winter culminated in the lowest water levels since 1949 when the annual breeding population survey was made on May 24, and 25, 1954. Of the 261 ponds in the area only 139 contained water and of these it was estimated 103 more would be dry by July 15 under normal conditions of evaporation and precipitation.

Table I shows that the decrease in water areas was not sufficient to reduce the breeding population, which was the largest yet recorded for the area. Mallards again showed a substantial gain while the number of blue-winged teal and diving ducks decreased. The latter may have been due to the lower water levels which left the emergent vegetation surrounded by mud flats.

Table I. - Breeding Population - Caron Potholes.

Species	1950	1951	1952	1953	1954
Blue-winged teal	75	90	143	154	114
Pintail	35	57	79	71	79
Shoveler	42	52	34	39	63
Mallard	31	34	111	154	193
Gadwall	18	33	40	53	62
Baldpate	28	24	26	39	52
Redhead	2	10	23	24	6
Lesser scaup	7	8	9	22	16
Green-winged teal	1	5	14	9	7
Canvasback	-	4	5	16	4
Ruddy duck	1	4	6	6	-
Cinnamon teal	-	-	-	-	1
Unidentified	-	-	-	4	11
Total Pairs	240	321	490	591	608
Per Square Mile	56.3	75.5	115.3	139.0	143.0

Brood counts using the "beat out" method were made on June 26 and 27 and August 9 and 10. Results from these counts were combined to give the total broods produced as shown in Table II. Forty-six ponds still contained water when the August count was made.

Table II. - Brood Production - Caron Potholes.

Species	1950	1951	1952	1953	1954
Blue-winged teal	12	39	74	108	84
Pintail	5	28	35	37	28
Shoveler	11	19	13	32	26
Mallard	13	10	58	53	47
Gadwall	8	11	12	14	24
Baldpate	13	12	17	19	17
Redhead	2	2	5	7	-
Lesser scaup	3	7	14	24	12
Green-winged teal	1	2	7	-	3
Canvasback	-	1	3	3	4
Ruddy duck	1	4	-	3	1
Unidentified	21	15*	31*	12*	7
Total	90	150	269	312	253
Per Square Mile	21.1	35.3	63.3	73.4	59.5

\* Rafted broods on larger waters without females. Total count taken and converted into broods by dividing by six.

The data show total brood production to have been below the 1953 level in spite of an increase in breeding pairs. Only 41 percent of the pairs produced broods compared with 52 percent in 1953, 54 percent in 1952, 46 percent in 1951 and 37 percent in 1950.

On a species basis the mallards apparently again had a poor year, producing only 47 broods from 193 pairs, a 24 percent success. In 1953 success was 34 percent. Pintails produced 28 broods from 79 pairs, a 35 percent success contrasted with 52 percent last year. The blue-winged teal which were exceptionally successful in producing broods last year (70 percent success) had another very successful season. From an estimated breeding population of 114 pairs, 84 broods were produced, a breeding success of 73 percent.

The outstanding feature of the 1954 season was, of course, the late spring and resulting delayed nesting season. This is reflected in a comparison of the percent of the total broods seen in June with that of August. In 1954, 15 percent were tallied on the June count; in 1953 (another late year) 17 percent, and in 1952 and 1951, relatively early years, 37 and 36 percent respectively.

## SOUTHEY STUDY AREA - SASKATCHEWAN

R. T. Sterling

The two square mile study area is located forty-one miles north of Regina, Saskatchewan. The terrain is moderately rolling with numerous small willow and aspen ringed potholes. Ninety percent of the area is under cultivation.

Most of the ponds contained water at freeze-up in 1953 and the normal spring runoff was sufficient to fill all ponds. From the middle of May onward, cool, wet weather persisted with a resulting rise in water levels. The ponds are now at their highest level for many years. Mature aspen are standing in as much as two feet of water and are showing signs of dying. In a few cases the marsh vegetation has already extended beyond the treed borders.

Breeding pair counts were carried out between May 15 and June 12. Mallard and Pintail had established nests before May 15 but incubation had not commenced.

Production was determined from two brood counts, one on June 29 and the other on August 12. Flooding of the treed borders made brood counts very difficult. The use of a dog which forced the females to show themselves was found very helpful.

The breeding population has been increasing steadily since 1952, see Table I. Breeding success has also improved, increasing from 36.8 percent in 1952 to 52.9 and 50.7 in 1953-1954 respectively.

Table I. - Breeding Population and Production - Southey Study Area - 1952, 1953, 1954 - Breeding Population

Species	Pairs			Broods		
	1952	1953	1954	1952	1953	1954
Mallard	13	19	27	5	9	13
Blue-winged teal	7	11	13	1	5	6
Pintail	6	10	13	2	4	7
Gadwall	1	3	1	1	-	1
Baldpate	3	3	5	2	3	2
Shoveler	2	3	2	1	3	2
Green-winged teal	2	-	1	2	1	1
Lesser scaup	2	2	3	-	-	2
Canvasback	1	-	2	-	1	1
Redhead	1	-	-	-	-	-
Ruddy	1	-	2	-	1	-
Total	38	51	69	14	27	35
Per Square Mile	19.5	25.5	34.5	7	13.5	17.5

35.4 percent increase in breeding population 1954-1953

29.6 percent increase in broods 1954-1953

Broods per pair ratio - 1952, 1:2.4; 1953, 1:1.9; 1954, 1:1.9

### Manitoba

Area- West half of province from International Boundary north to Township 26.

	1953	1954
Size of sample - square miles	50	50
Breeding pairs per square mile	24.5	32.8
Water areas per square mile - May	4.3	6.2

### Species Breakdown

Species	1953	1954
Mallard	429	548
Pintail	137	173
Gadwall	21	32
Baldpate	78	81
Shoveler	64	38
Blue-winged teal	210	242
Green-winged teal	46	47
Canvasback	94	167
Redhead	42	91
Lesser scaup	75	161
Ring-necked duck	12	12
Ruddy duck	17	38
Bufflehead	2	11
Total Pairs	1227	1641

The transects show an over-all increase of 33 percent in breeding population. All species increased with the exception of the shoveler which were reduced 41 percent. Increases shown by the diving ducks were most conspicuous.

COOPERATIVE WATERFOWL BREEDING GROUND SURVEY IN  
ONTARIO, NORTHERN MANITOBA, AND NORTHERN SASKATCHEWAN

1954

Edward G. Wellein

Introduction

This report covers the aerial survey work accomplished during the summer of 1954 in the Provinces of Ontario, Northern Manitoba, and Northern Saskatchewan. The habitat involved in this survey is, generally speaking, of a low waterfowl breeding population density when compared to the prairie pothole region. This habitat is so extensive, however, that in the aggregate it contributes very materially to the total continental waterfowl population, and, therefore, must be considered in the evaluation of the population. To expedite and organize the survey work the habitat has been divided into strata or sampling zones. Stratum C is described as the closed forest zone and extended over the three Provinces involved. Stratum D is, specifically, the Saskatchewan River delta, which is located both in Manitoba and Saskatchewan. Stratum E is the open forest tundra zone, which also extends through all three Provinces.

The primary objective of the survey this year, as in the past, was the collection of quantitative data on waterfowl breeding populations during May for use by the Waterfowl Regulations Committees of Canada and the United States in determining waterfowl regulations. Another objective was to attempt to measure the success of the breeding population by conducting an aerial brood survey during the month of July.

This year the aerial survey work was divided into two parts--the breeding pair survey, which was conducted during May, and the production survey, which was conducted during July. The breeding pair survey was begun on May 11 this spring. Practically all lakes were still frozen over and snow or mud kept many of the air-fields closed to traffic. Operation of aircraft was therefore difficult as well as hazardous, and refueling facilities were at a minimum. Two aircraft were used on the May survey. One, a Grumman Widgeon, flown by Mr. Crissey and Mr. Glover, both of the U. S. Fish and Wildlife Service, accounted for 241 square miles of sample in that portion of the Province of Ontario east of Kapuskasing, and the remainder of the coverage was made in a Grumman Goose aircraft flown by the writer, with Roe Meyer, U. S. Game Management Agent, as observer. Approximately 90 hours of flying time, including the deadheading, was required with the Goose to complete the May survey, and 80 hours for the July survey, which was made entirely with the Goose.

The beginning of the production survey was delayed beyond the intended starting date because of aircraft propeller trouble. In past years surveys were begun about July 10, but this year the first transect was flown on July 16. Considering the lateness of the season it is entirely possible that the brood survey was started too early because the phenology of the season was much retarded as compared to the past five years.



### Methods Used and Areas Covered

A standard 1/4 mile wide transect was used in both the breeding pair and production survey. Waterfowl were recorded by species, and when possible, separated into pairs and lone drakes. An attempt was made to record broods by species, age, class and number per brood, but in general this was not possible.

In locating and arranging the transects it was necessary to consider the availability of gasoline, but an attempt was made to distribute the sampling as evenly as possible. During the May survey, because of ice, it was not possible to adequately sample Stratum E in Manitoba, and during the July survey time did not permit obtaining any coverage in the Province of Ontario.

Table I shows the amount of the aerial coverage flown in the several provinces during both May and July. The accompanying maps show the location of the transects.

Table I. - Aerial Coverage Accomplished, 1954.

#### May Breeding Pair Survey

Province	Stratum	Square Miles Covered	Stratum Area
Ontario	C	898.5	264,508
Manitoba	C	342.7	67,630
Manitoba	D	122.3	3,960
Saskatchewan	C	322.0	110,850
Saskatchewan	E	196.0	25,170
Total		1,881.5	472,118

#### July Brood Survey

Province	Stratum	Square Miles Covered	Stratum Area
Manitoba	C	369.0	67,362
Manitoba	D	122.3	3,960
Manitoba	E	296.0	105,000
Saskatchewan	C	322.0	110,850
Saskatchewan	E	196.0	25,170
Total		1,305.0	312,342

#### Weather and Water Conditions

This spring was the most retarded that the writer has experienced in five years in the north. As mentioned previously, almost all lakes were still completely ice covered on May 11. Caldam Bay was not ice free until May 17, whereas, last year

the ice went out on May 4. About two feet of snow was still present in the bush in the country east of Kenora during the May survey. The season was late over the entire country, but it was most retarded in that area between Kenora and Armstrong Station. At that time the only water available to waterfowl was at the mouths of fast streams emptying into lakes. However, from Kenora to Armstrong Station 32 percent of the mallards recorded were lone drakes, indicating at least that some nesting was in progress.

The weather for the most part was cold and cloudy, and lakes did not start to open up until about May 20. Even then lakes in the northern portion of the provinces remained frozen, and during late May and the early part of June the larger lakes, such as Atikameg, Reindeer lake, Wollaston Lake, Black Lake, and Lake Athabaska, were still ice covered.

Because of the extremely retarded spring there was practically no early hatch of ducks in the north. The late nesting season was further hampered by very extensive, frequent, and prolonged rains, which usually are conducive to high egg and juvenile mortality. River deltas, which are the highest duck producing areas in the north (such as the Athabaska and Saskatchewan River deltas), have been extensively and severely flooded, and as a result waterfowl nesting (especially scaup) has been seriously disrupted. Even in the precambrian area, which is usually immune to flooding, many of the better waterfowl breeding areas (such as Pukatawagan and the English River drainage) show the result of too much rain. In this area, because of the shortness of the season, it is unlikely that extensive renesting can occur.

#### Breeding Populations Survey

A total duck index for each stratum was computed on data collected during the survey, and is presented in Tables II through VII. All data have been corrected for hens on nests.

Stratum C in Ontario shows a decrease of 38.7 percent from 1953. The 1953 figures, however, were 62 percent above those of 1952. Large decreases were recorded for mallards, mergansers, and ring-necked ducks. Black ducks increased sharply and scaups showed a slight increase. The increase in black ducks was probably due to the additional sampling in eastern Ontario.

A substantial decrease (40 percent) was also recorded for Stratum C in Manitoba. All species but the baldpate showed a decrease, but the most important decreases were in the mallard, scaup, and ring-necked ducks. A decrease of 66 percent was recorded for the mallard.

The Saskatchewan River delta (Stratum D), which has the highest breeding density of any area covered in this survey, had a population decrease of 26 percent.. All species of ducks, except ring-neck and scoter, decreased in numbers from 1953. The most important decreases were, again, in the mallard and scaup.

In Stratum C Saskatchewan a 20 percent decrease in total duck numbers from 1953 was indicated. Again, mallard and scaup showed an important decrease. The only species which increased were the redhead and ring-necked duck.

For Stratum E Saskatchewan a slight increase, probably not significant, was recorded. Mallard, however, decreased 20 percent. The ring-necked duck showed a small increase.

Combining all the strata together and considering the area surveyed as a whole (472,119 square miles) it appears that the total duck population decreased approximately 32 percent.

#### Brood Survey

Identification of duck broods in a multi-specie area from an aircraft traveling 130 miles per hour is not practicable and very seldom possible. Counting of the number per brood from the air was also found to be impracticable. Therefore, it was not possible to organize the brood data by species and number per brood. Table VIII is based on data recorded.

Brood data for previous years are not available for comparison except in Stratum D Manitoba, which is the Saskatchewan River delta. In this area the number of broods computed for the stratum dropped from 3302 in 1953 to 950 in 1954 for a decrease of approximately 71 percent.

#### Summary and Conclusion

1. The spring of 1954 was extremely retarded over the entire Canadian waterfowl breeding range. Ice conditions were severe, most lakes opening at least two weeks later than average. Some people have stated that it was the latest spring since 1922.

2. A decrease in total breeding ducks ranging from 20 to 40 percent was obtained for Stratum C in all three Provinces.

3. Stratum D, which extends into both Manitoba and Saskatchewan, showed a decrease in total duck numbers of 26 percent.

4. A small increase (4 percent) was obtained for total breeding ducks in Stratum E Saskatchewan.

5. The mallard decreased in all strata and provinces surveyed. The decrease ranged from 20 percent in Stratum E Saskatchewan to 67 percent in Stratum C Manitoba.

6. Scaup showed a decrease (4 - 58 percent) in every stratum except Stratum C Ontario where a 12 percent increase was recorded.

7. Considering the entire area surveyed as a unit, a decrease of total duck breeding densities of approximately 32 percent is indicated.

8. It seems reasonable to believe that the retarded spring was at least in part responsible for the decrease from 1953 in the waterfowl breeding population for this area. However, if this is true a corresponding increase in breeding ducks should have been recorded elsewhere, and, therefore, these data must be considered along with those collected in the prairie provinces and states to the south, if a complete picture is to be obtained.

9. Brood data are available for previous years only in Stratum D Manitoba. Comparing these data, 71 percent less brood was observed this year than in 1953.

10. In view of the spring survey data, the retarded nesting season and the frequent and excessive rains during the month of June, there appears to be no reason to expect a bumper crop of ducks from the north country this year.

Table II. - Total Duck Index Stratum C - Ontario, 1953-1954.

Species	Species Composition 1954	Percent Lone Drakes 1954	Index 1953	Index 1954	Percent Change
Mallard	12.2	22.8	137,544	53,245	- 61.3
Black duck	18.0	35.7	7,935	78,559	+890.0
Gadwall	-	-	-	-	
Baldpate	1.2	0	-	5,237	
Pintail	.9	20.0	-	3,928	
G-w. teal	.7	75.0	-	3,055	
B-w. teal	-	-	-	-	
Shoveler	-	-	-	-	
Merganser	28.2	23.1	409,987	123,075	- 69.9
Redhead	-	-	-	-	
Ring-neck	4.3	10.2	79,352	18,766	- 76.3
Canvasback	-	-	-	-	
L. scaup	10.2	5.1	39,676	44,517	+ 12.2
Golden-eye	8.9	26.5	10,580	38,843	+267.0
Ruddy duck	-	-	-	-	
Bufflehead	.1	100.0	5,290	436	- 91.7
Scoter	.4	0	-	1,745	
Unidentified	14.9		21,161	65,029	+207.3
Total		22.9	711,525	436,435	- 38.7

Table III. - Total Duck Index Stratum C - Manitoba.

Species	Species Composition 1954	Percent Lone Drakes 1954	Index 1953	Index 1954	Percent Change
Mallard	23.5	55.3	145,898	48,474	- 66.8
Black duck	.2	0	-	412	
Gadwall	-	-	-	-	
Baldpate	4.0	17.6	7,588	8,251	+ 8.7
Pintail	.6	60.0	2,414	1,238	- 48.7
G-w. teal			1,380		
B-w. teal	-	-	-	-	
Shoveler	-	-	-	-	
Merganser	20.3	20.0	76,571	41,873	- 45.3
Redhead	-	-	-	-	
Ring-neck	2.0	29.4	18,281	4,125	- 77.4
Canvasback	-	-	-	-	
L. scaup	17.5	3.4	85,883	36,097	- 57.9
Golden-eye	.7	66.6	4,484	1,444	- 67.8
Ruddy duck	-	-	-	-	
Bufflehead	.9	25.0	2,414	1,856	- 23.1
Scoter	2.7	30.4	-	5,569	
Unidentified	27.6		-	56,931	
Total		28.7	344,913	206,270	- 40.2

Table IV. - Total Duck Index Stratum D - Manitoba, 1953 - 1954.

Species	Species Composition 1954	Percent Lone Drakes 1954	Index 1953	Index 1954	Percent Change
Mallard	17.2	55.0	21,156	12,737	- 39.8
Black duck	-	-	-	-	-
Gadwall	-	-	598	-	-
Baldpate	2.7	9.8	4,191	1,999	- 52.3
Pintail	4.0	52.0	5,987	2,962	- 50.5
G-w. teal	Tr.	100.0	1,896	Tr.	-
B-w. teal	1.5	7.1	4,091	1,111	- 72.8
Shoveler	1.2	13.0	4,391	889	- 79.7
Merganser	1.1	20.0	2,096	814	- 61.2
Redhead	2.6	18.4	4,391	1,925	- 56.2
Ring-neck	2.7	40.0	998	1,999	+ 50.1
Canvasback	21.2	21.2	7,085	3,925	- 44.6
L. Scaup	33.5	5.3	40,815	24,807	- 39.2
Golden-eye	.6	0	Tr.	444	-
Ruddy duck	.2	20.0	898	148	- 83.5
Bufflehead	.2	0	698	148	- 78.8
Scoter	2.5	6.5	1,297	1,851	+ 29.9
Unidentified	24.7	-	-	18,291	-
Total		21.2	100,588	74,050	- 26.5

Table V. - Total Duck Index Stratum C - Saskatchewan, 1953 - 1954.

Species	Species Composition 1954	Percent Lone Drakes 1954	Index 1953	Index 1954	Percent Change
Mallard	20.6	52.0	117,501	66,907	- 43.0
Black duck	-	-	-	-	-
Gadwall	-	-	-	-	-
Baldpate	1.2	20.0	9,977	3,897	- 60.9
Pintail	2.7	37.5	6,651	8,769	+ 31.8
G-w. teal	.5	0	2,217	1,624	- 26.7
B-w. teal	1.5	11.1	-	4,872	-
Shoveler	.4	20.0	-	1,299	-
Merganser	6.9	31.3	98,656	22,410	- 77.3
Redhead	.8	11.1	2,217	2,598	+ 17.2
Ring-neck	1.7	14.3	6,651	5,521	+ 17.0
Canvasback	2.4	31.0	7,759	7,795	+ .5
L. Scaup	24.9	6.3	101,982	80,873	- 20.7
Golden-eye	.2	0	-	649	-
Ruddy duck	.6	14.3	-	1,949	-
Bufflehead	3.6	30.2	6,651	11,692	+ 75.8
Scoter	4.2	2.0	2,217	13,641	+515.2
Unidentified	27.8		50,991	90,292	+ 77.1
Total		23.8	413,470	324,788	- 20.2

Table VI. - Total Duck Index Stratum E - Saskatchewan, 1953 - 1954.

Species	Species Composition 1954	Percent Lone Drakes 1954	Index 1953	Index 1954	Percent Change
Mallard	21.1	71.4	17,367	13,914	- 19.9
Black duck	-	-	-	-	
Gadwall	-	-	-	-	
Baldpate	.3	100.0	-	198	
Pintail	-	-	-	-	
G-w. teal	-	-	-	-	
B-w. teal	.5	100.0	-	330	
Shoveler	-	-	-	-	
Merganser	10.9	30.0	10,068	7,188	- 28.6
Redhead	1.6	0	-	1,055	
Ring-neck	2.7	40.0	1,510	1,780	+ 17.9
Canvasback	2.7	80.0	-	1,780	
L. Scaup	23.8	12.6	16,360	15,695	- 4.1
Golden-eye	-	-	-	-	
Ruddy duck	-	-	-	-	
Bufflehead	4.4	37.5	1,510	2,901	+ 92.1
Scoter	13.4	51.0	7,804	8,837	+ 13.2
Unidentified	18.6		8,809	12,266	+ 39.2
Total		41.6	63,428	65,944	+ 3.9



Table VII. - Duck Index for Entire Area Surveyed, May Survey.

Stratum	Index		Percent Change
	1953	1954	
C Ontario	711,525	436,435	- 38.7
C Manitoba	344,913	206,270	- 40.2
D Manitoba	100,588	74,050	- 26.5
C Saskatchewan	413,470	324,788	- 21.4
E Saskatchewan	63,428	65,944	+ 3.9
Total	1,633,924	1,107,487	- 32.2

Table VIII. - Ducks and Brood Index, July Survey.

Stratum	Ducks Observed	Broods Observed	Sample Sq. Mi.	Ducks Broods		Stratum Area	Total Index	
				per Sq. Mi.	per Sq. Mi.		Duck	Brood
Manitoba C	240	12	369.0	.65	.032	67,362	43,785	2,156
Manitoba D	1317	30	122.3	10.76	.240	3,960	161,069	950
Manitoba E	420	18	296.0	1.42	.061	105,000	149,100	6,405
Saskatchewan C	617	22	322.0	1.91	.068	110,850	211,724	7,538
Saskatchewan E	293	15	196.0	1.44	.076	25,170	36,245	1,893
Total	2887	97	1305.3	2.21	.074	312,342	601,923	18,942

## WATERFOWL BREEDING GROUND SURVEY, SOUTHERN ONTARIO, 1954

George M. Stirrett

Introduction

A survey of waterfowl breeding grounds in southern Ontario was carried out during the summer of 1954 over the same areas, by the same personnel, and by the same methods as during the past three years.

Two independent surveys were made. One, by the author, covered some 40 water areas throughout southern Ontario, south of a line drawn from Sault Ste. Marie easterly to Sudbury, Temagami, Arnprior, and Cornwall. This survey was made intermittently between May 1 and July 20. The other survey was carried out by H. G. Lumsden, Fish and Wildlife Division, Ontario Department of Lands and Forests, Tweed, Ontario. Mr. Lumsden examined the waterfowl breeding areas of the Tweed District in south central Ontario and within the general area covered by the author. This was done by a ground survey on July 18 and 22 and an aerial survey on July 21.

The results of these studies alone were used in compiling the data on breeding waterfowl populations so that they would be comparable with the data of previous years. In compiling the brood success, the results of these surveys were combined with brood data secured from the reports of correspondents within the survey area who took part in the Quarterly Survey of Waterfowl Conditions in Ontario. This survey is carried out jointly by the Canadian Wildlife Service and the Fish and Wildlife Division, Ontario Department of Lands and Forests. Also included are the brood records supplied by W. J. Douglas Stephens for Toronto Island; these were taken in June.

Weather and Water Conditions

A cold, wet spring was probably responsible for the late arrival in southern Ontario of migrant waterfowl. The birds were about one week to 10 days late and this resulted in a later than usual nesting season. The entire summer was characterized by cool, wet weather in most areas. In many areas, the precipitation for the summer months was greater than for any year on record.

Water levels in the northern section of the area surveyed were high during the entire season, while those in the southern section, particularly the Great Lakes, were closer to normal. In the Conroy marsh area, surveyed by Mr. Lumsden, the water levels fluctuated because of repairs to a dam. These fluctuations caused some destruction of ring-necked duck nests that were started during the low water level and subsequently flooded. No other damage from fluctuating water levels was noted in the area surveyed.

### Breeding Waterfowl Populations

The total waterfowl population on the 63 habitats examined was 1337. This is a slight increase from 1953 when the population was 1222; about the same as in 1952 when it was 1358; and an increase from 1951 when it was 1141,

Seventeen species of breeding waterfowl were found in the area. The numbers of each of the 10 most abundant species are shown in the following table.

Table I. - List of Breeding Waterfowl and Number of Individuals of Each Species with Comparisons for Other Years.

Species	1954	1953	1952	1951
Mallard	204	199	111	59
Black duck	321	461	356	131
Blue-winged teal	137	148	137	161
Wood duck	195	63	79	18
Ring-necked duck	73	40	-	26
Lesser scaup	35	83	43	37
Common golden-eye	140	43	112	96
Hooded merganser	26	-	34	7
Common merganser	107	67	65	32
Coot	66	65	66	62

In addition, the following ducks were represented by five or less individuals during the present season; baldpate, pintail, green-winged teal, shoveler, redhead, bufflehead, and ruddy duck.

The mallard, blue-winged teal, hooded merganser, and coot maintained about the same status as in 1953, while the black duck and lesser scaup duck decreased in numbers and the wood duck, ring-necked duck, common golden-eye, and common merganser showed an increase in population over 1953.

In spite of increased populations of mallards and wood ducks during the past four years, the black duck still is the most abundant breeding duck in southern Ontario.

### Brood Success

The following table gives a record of all broods observed from 1951 through 1954.

Table II. - Average Size of Broods - Comparison with Other Years.

Species	1954	1953	1952	1951
Mallard	6.1 (46)	5.8 (19)	5.7 (19)	4.5 (2)
Black duck	5.0 (51)	5.4 (30)	6.3 (37)	5.4 (6)
Blue-winged teal	6.4 ( 7)	6.4 ( 8)	8.6 ( 9)	6.0 (1)
Wood duck	4.6 ( 9)	4.0 (10)	5.8 (19)	7.6 (2)
Ring-necked duck	4.8 (16)	5.6 (44)	5.3 (58)	5.9 (19)
Lesser scaup	7.0 ( 2)	-	-	3.0
Common golden-eye	5.7 (18)	4.7 (12)	5.1 (22)	7.3 (8)
Hooded merganser	7.6 ( 3)	7.1	-	8.0
Common merganser	9.8 ( 6)	9.0 ( 2)	6.0 (11)	4.2 (4)
Coot	3.6 ( 3)	5.0 ( 3)	3.0 ( 2)	3.3 (6)

The bracketed figures refer to the numbers of broods from which averages are derived.

Brood success remained about the same as in 1953 in the black duck, blue-winged teal, and hooded merganser. Mallard, wood duck, common golden-eye and common merganser produced larger broods than in 1953, while the ring-necked duck and coot produced, on the average, less young than during the previous year. The decrease in the average size of broods in the ring-necked duck was brought about by the poor success they had in the best local breeding area in southern Ontario. Brood success for this species outside this one marsh was about normal for the species. It is thought that fluctuating water levels which occurred on this marsh this year were the cause of the poor brood success.

### Summary and Conclusions

Waterfowl breeding ground surveys were again carried out in southern Ontario by the same personnel, by the same methods, and on the same 63 habitats as during the past three years.

The weather throughout the season was cool and wet. Water levels were high in the northern portion of the area surveyed and about normal in the southern portion. No damage was reported or observed from high or fluctuating water levels, except in one small area where a dam was being built. Nesting was from seven to 10 days later than in 1953. Cool and wet weather did not appear to hamper nesting operations and brood production.

A total of 1337 individual waterfowl was found on the 63 habitats. This number is a slight increase in the total for 1953 and about the same as the population for 1952.

The black duck is the most abundant breeder in the area, followed by mallard, wood duck, common golden-eye, and blue-winged teal.

The results of the surveys would indicate that no species experienced a really poor season but some had a better one than others. The following comments, by species, should give an idea of waterfowl production in southern Ontario in 1954.

The wood duck had both a larger breeding population and an increased brood success as did the golden-eye and common merganser.

The mallard maintained a comparable breeding population but brood success was greater than in 1953.

Blue-winged teal, ring-necked duck, lesser scaup, and hood merganser populations may remain at about the same levels as in 1953 because of lower breeding populations or poorer brood success.

The black duck and coot populations may show a slight decrease in numbers, because of a decrease in numbers of breeding birds in the case of the black duck and poorer brood success in the case of the coot.

The season appeared to be particularly favorable to hole-nesting ducks; wood duck, common golden-eye, and common merganser had an increased breeding population and better brood success, while the hooded merganser maintained about the same status as in 1953.

## WATERFOWL BREEDING GROUND SURVEY IN QUEBEC AND LABRADOR

Fred A. Glover, W. F. Crissey  
and  
A. P. Noltemeier

### Introduction

The third aerial waterfowl breeding ground survey in the Provinces of Quebec and Labrador consisted of coverage comparable to that of 1953 (See Map). Techniques used in the surveys were the same as in previous years. In addition to the usual breeding pair survey in May and early June and the production survey in July, a reconnaissance was made in late August and early September to locate waterfowl concentration areas in Eastern Canada for the purpose of establishing future banding stations.

Personnel for the three Quebec and Labrador surveys consisted of Fred A. Glover, accompanied by W. F. Crissey on the breeding pair survey, A. P. Noltemeier on the brood survey, and C. E. Addy on the banding reconnaissance flight, all of the U. S. Fish and Wildlife Service. Coverage for the respective Canadian flights was: breeding pair survey, 6,126 lineal transect miles; brood survey, 5,789 lineal transect miles; and banding reconnaissance, 7,200 miles.

### Weather and Water Conditions

Weather and water conditions during the production period presented an irregular and highly contrasting picture in Quebec and Labrador with some areas experiencing near drought conditions while other areas were being deluged with rain. During May the southern half of Canada experienced precipitation four times above the normal for the last four years. The mean temperature for the same area was five degrees below normal. June was normal in rainfall and temperature, but July had twice the normal number of days with rain and the temperature was about three degrees below normal. Northern Canada in June had above normal rainfall and below normal temperatures. May and July were about normal. Along the east shore of Hudson Bay from Great Whale River north there was a noticeable lack of rainfall.

### Breeding Pair Survey

Compared with last year, progress on the waterfowl breeding pair survey was delayed approximately one week due to weather and aircraft mechanical difficulties. The dates of the survey were May 3 to June 15. However, comparison of the phenology of the two years at the completion of the various transects was similar. Tables I and II present a comparison of the 1953-1954 data for comparable areas.

In general the 1954 survey data indicated an increase in the total breeding pairs as compared with the 1953 information. Species noticeably up were black duck and golden-eye. Insignificant changes in breeding population was indicated by the ring-necked

duck and pintail. Scaup, merganser and scoter were down noticeably throughout eastern Canada. Comparable data were obtained on shoreline counts and a summary of the information is shown in Table III. At present a lack of understanding between the relationship of waterfowl along shorelines and what they represent in relation to breeding populations has made it difficult to interpret or analyze the shoreline data for significant trends.

### Production Survey

The second aerial survey of waterfowl production in Quebec and Labrador was conducted from July 6 to 30. There was a marked reduction in the data obtained on this year's production as compared with that of 1953. Although indicated production was materially down, this year's spring breeding populations were above those of 1954 so that a good carryover of adult birds could be expected. The data indicated that not only was the number of duck broods down from 1953 (39 percent), but also, because of a drop in brood size, that the total young produced dropped 49 percent as compared with last year (Table IV). Potential later production based on singles and pairs on territory indicated about the same as 1953. No significant trend was apparent in the Canada goose production in Quebec and Labrador between 1953 and 1954 (Table V).

A total of 606 lineal miles of shoreline were covered during the production survey period. One count was taken along the north shore of the St. Lawrence River from the mouth of the Saguenay River to Seven Islands. Another shoreline count was made from Port Harrison north along the east shore of Hudson Bay to the  $59^{\circ} 40'$  parallel. Two shoreline counts were made in Ungava Bay, one from the  $59^{\circ} 40'$  parallel near Payne Bay to the mouth of the Koksoak River in which the course flown was about five miles inland from the shore; the other along the east shore from the mouth of the Koksoak River to  $59^{\circ} 13' N$  and  $65^{\circ} 30' W$ . These data are summarized in Table VI.

### Summary of Breeding Grounds Survey

Aerial coverage of the Eastern Canada waterfowl breeding grounds in 1954 was comparable with 1953. Weather and water conditions were inconsistent over the breeding grounds and may have been an important factor influencing the production. The 1954 breeding population of ducks was above that of 1953 while the goose population was somewhat lower. Duck production was irregular and noticeably reduced in 1954 as compared to 1953. Goose production, on the other hand, was fair and compared favorably with 1953.

Table I. - Index to the Number of Pairs, Singles, Grouped and Total Birds of the More Important Species Observed in Quebec and Labrador, 1953 and 1954.

Species	Pairs		Singles		Grouped Birds		Adjusted Total		Percent Change
	1953	1954	1953	1954	1953	1954	1953	1954	
Black duck	42,429	60,776	31,976	37,103	86,690	110,904	235,500	306,664	+ 30
Golden-eye	25,106	75,845	5,226	52,713	38,695	54,825	99,323	311,948	+214
Scaup	23,165	15,685	4,212	4,160	7,371	5,625	62,125	47,315	- 24
Unidentified	7,204	31,704	10,419	39,994	64,884	54,711	100,130	198,109	+ 98
Sub-total	97,904	185,010	51,833	133,970	197,640	226,065	497,078	864,036	+ 74
Merganser	109,846	57,667	74,337	62,670	132,681	114,440	501,047	355,115	- 29
Scoter	31,925	22,310	5,791	13,036	80,512	61,743	155,944	132,436	- 15
Total ducks	239,675	264,987	131,961	209,676	419,833	402,248	1,154,069	1,351,587	+ 12
Canada geese	32,679	48,353	16,740	31,681	216,785	60,956	315,623	221,024	- 30



Table II. - Waterfowl Breeding Population Index by Stratum, Quebec and Labrador, 1953 and 1954.

	Mixed Boreal		Main Boreal		Open Boreal & Forest Tundra		Tundra		Total	
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
Square Miles in Stratum	29,780		180,820		379,180		117,480		707,260	
Black duck	12,763	9,926	71,884	108,016	143,732	171,319	7,121	17,403	235,500	306,664
Golden-eye	5,236	14,062	17,747	150,801	76,340	140,124	-	6,961	99,323	311,948
Scaup	-	-	-	701	62,125	37,332	-	9,282	62,125	47,315
Unidentified	3,271	5,790	-	31,563	54,227	116,088	21,777	44,668	100,130	198,109
Sub-total	21,270	29,778	89,631	291,081	336,424	464,863	28,898	78,314	497,078	864,036
Merganser	27,488	16,544	256,475	135,370	209,544	197,400	7,540	5,801	501,047	355,115
Scoter	-	-	51,915	7,365	103,191	105,348	838	19,723	155,944	132,436
Total Ducks	48,758	46,322	398,021	433,816	649,159	767,611	37,276	103,838	1,154,069	1,351,587
Canada geese	-	8,272	2,219	11,924	115,301	141,658	198,103	59,170	255,657	221,024

Table III. - Number of Birds Observed Along Shorelines During Breeding  
Population Surveys, Quebec and Labrador, 1953-1954.

Species	Number of Birds		Birds per Lineal Mile*	
	1953	1954	1953	1954
Black duck	4,905	2,761	7.44	4.64
Ring-neck	382	268	.58	.45
Golden-eye	356	762	.54	1.28
Scaup	641	1,918	1.02	3.22
Green-winged teal	23	98	.03	.16
Pintail	41	454	.06	.76
Mallard	132	23	.20	.03
Sub-total	6,480	6,284	9.82	10.56
Merganser	918	348	1.39	.58
Scoter	13,844	5,322	21.00	8.94
Eider	2,767	3,881	4.20	6.52
Unidentified	255	520	.39	.87
Total Ducks	24,264	16,355	36.76	27.49
Canada Geese	490	1,663	.74	2.79
Snow Geese	25,500	22,000	**	**
Brant	3,838	6,139	5.82	10.32

\* Mileage in 1953 was 660 and in 1954, 595.

\*\* Found all in one place.

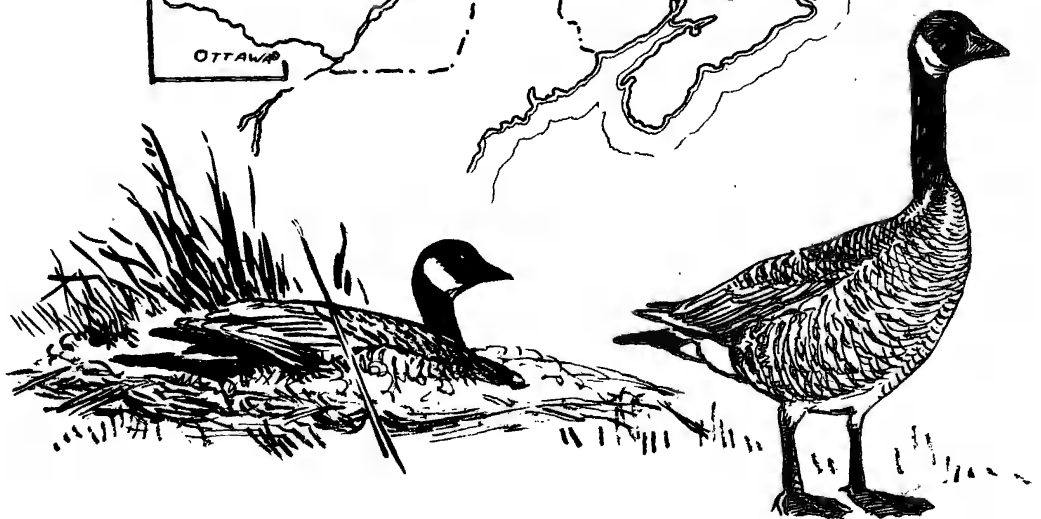
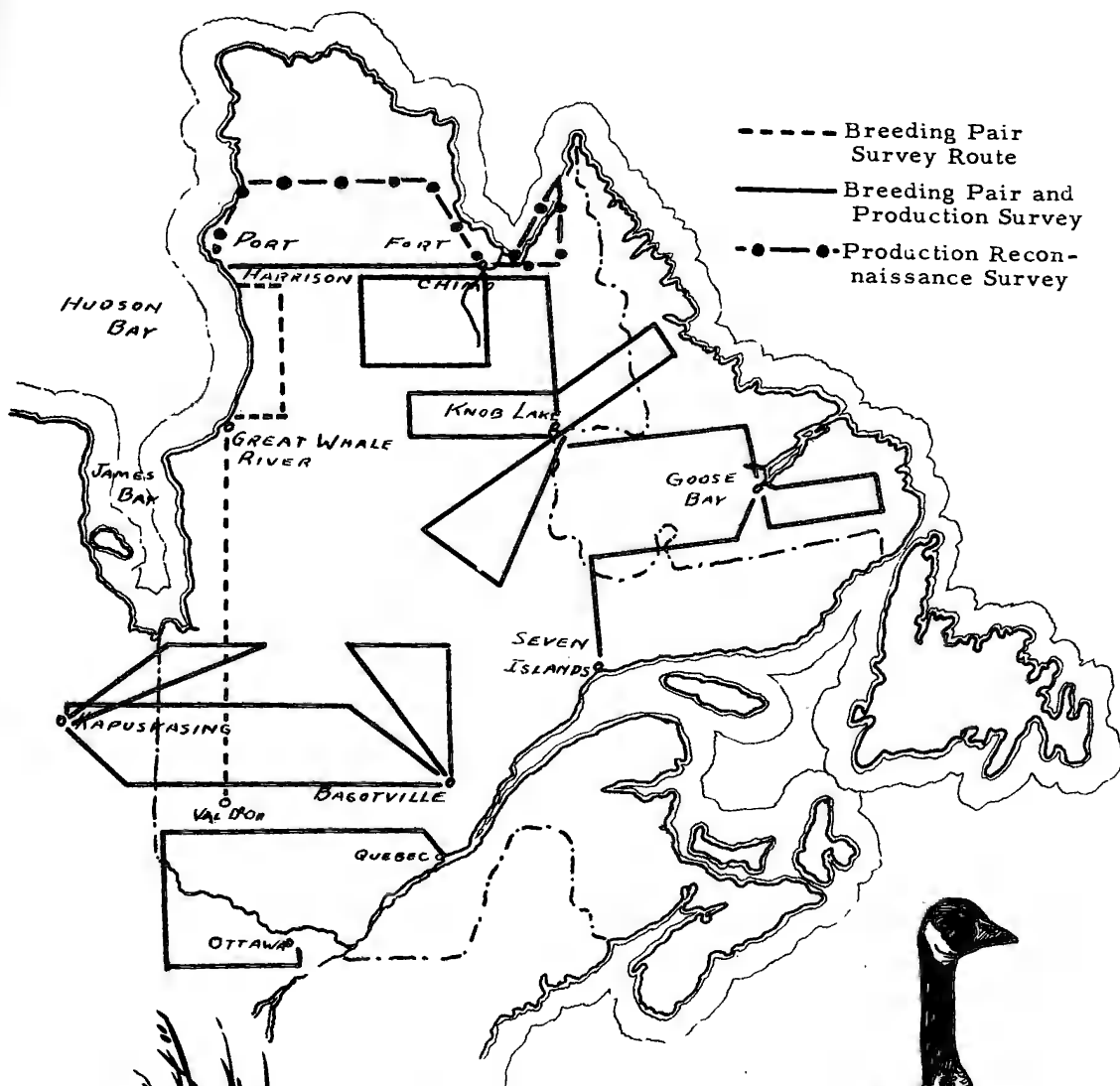
Table IV. - Duck Brood Production Indices, Quebec and Labrador, 1954.

Strata					
	Mixed Boreal	Main Boreal	Open Boreal & Forest Tundra	Tundra	Total
Class I					
No. Broods	-	2,148	10,742	-	12,890
Avg. Size	-	3.75	4.75	-	4.58
No. Young	-	8,055	51,025	-	59,080
Class II					
No. Broods	-	8,161	9,046	423	17,630
Avg. Size	-	4.94	3.66	4.0	4.26
No. Young	-	40,315	33,108	1,692	75,115
Class III					
No. Broods	389	1,289	6,784	-	8,462
Avg. Size	6.0	5.66	3.80	-	4.18
No. Young	2,334	7,296	25,779	-	35,409
Total					
No. Broods	389	11,598	26,572	423	38,982
Avg. Size	6.0	4.80	4.14	4.0	4.35
No. Young	2,334	55,666	109,912	1,692	169,604

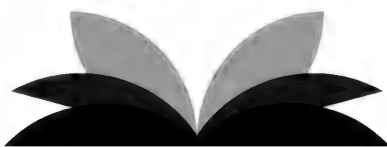
Table V. - Goose Brood Production Index, Quebec and Labrador, 1954.

Strata						
	Mixed Boreal	Main Boreal	Open Boreal & Forest Tundra	Tundra	Total 1953	Total 1954
Class I						
No. Broods	-	-	-	1,268	2,072	1,268
Avg. Size	-	-	-	4.33	2.25	4.33
No. Young	-	-	-	5,490	4,662	5,490
Class II						
No. Broods	-	859	2,827	2,536	11,669	6,222
Avg. Size	-	3.50	4.80	2.83	2.70	3.82
No. Young	-	3,006	13,570	7,177	31,468	23,753
Class III						
No. Broods	-	-	3,957	423	2,535	4,380
Avg. Size	-	-	3.66	3.00	2.80	3.59
No. Young	-	-	14,483	1,269	7,092	15,752
Total						
No. Broods	-	859	6,784	4,227	16,276	11,870
Avg. Size	-	3.50	4.14	3.30	2.65	3.79
No. Young	-	3,006	28,053	13,936	43,222	44,995

# BREEDING GROUND SURVEYS IN QUEBEC AND LABRADOR - 1954



BHL



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Table VI.-Waterfowl Observed Along 606 Lineal Miles of Shoreline in Quebec  
During July 1954.

Species	Number of Birds	Birds per Lineal Mile
Black duck	298	.49
Golden-eye	256	.42
Scaup	25	-
Merganser	396	.65
Scoter	753	1.24
Eider	3,848	6.35
Old Squaw	140	.23
Unidentified	1,313	2.17
<hr/>		
Total Ducks	7,029	11.60
Canada Geese	1,103	1.82

## WATERFOWL BREEDING GROUND SURVEY, QUEBEC, 1954

Louis Lemieux

Introduction

The breeding ground survey was conducted for the sixth consecutive year in the Province of Quebec in 1954 and the brood survey, initiated in 1951, was also repeated.

The breeding ground survey was conducted by Messrs. Louis Lemieux and Raymond Cayouette, Quebec Zoological Garden (Quebec Department of Fish and Game). The brood survey was made by Louis Lemieux.

Methods and Area Surveyed

This survey was altered in many ways this year; Lochaber Bay, Carillon Island and Bay, the west end of Lake Saint Peter and a portion of the south shore of the St. Lawrence River (from Montmagny to Riviere-du-Loup), all of which used to be included in the survey, were left out. Waterfowl observed in those areas in the past were migrants and their numbers could hardly be usefully compared from year to year. The survey was repeated between Riviere-du-Loup and Matane, and the new areas were investigated, namely, Apple Island, near Ile Verte in the St. Lawrence, and the Lake St. John - Chibougamau area.

Apple Island is a low, rocky island, approximate one and one-half miles long and one-half mile wide, situated two miles offshore, between Ile Verte and Ile aux Basques. There are hardly any trees on the island; it is covered with low shrubs, *Vaccinium* sp., *Empetrum* sp.; *Juniperus* sp., etc. The island supports a large number of breeding eider ducks, herring gulls, double-crested cormorants and a few black ducks. Surveys of an island such as this one should supply an index of the fluctuations of the breeding population of eiders and data on their breeding success. Nests were counted along transect lines.

The Lake St. John and Chibougamau district was also surveyed this year, with largely negative results. A reconnaissance was made by automobile around Lake St. John and along the road to Chibougamau. Hardly any waterfowl were observed and it is considered that this district offers no good possibility for breeding ground surveys.

The dates of the survey were also changed this year. Formerly the survey was made early in May; it was felt that this was too early and that many of the birds observed at that time were migrants on their way north to their breeding grounds. Accordingly, the survey made along the St. Lawrence River and at Apple Island was conducted from June 4 to June 10 and the Lake St. John area was visited at the end of June.



### Climatic Conditions

Spring started early in southern Quebec in 1954 but was later delayed. Conditions were about normal at the time the surveys were made.

### Brood Survey

The brood survey was conducted along the south shore of the St. Lawrence River between Riviere-du-Loup and Matane, by automobile, from July 6 to July 9.

Table I. - Breeding Population, Riviere-du-Loup to Matane, 1952, 1953, and 1954.

Species	1952	1953	1954
Common eider	1,713	2,147	1,676
American brant	2,051	1,542	592
Canada goose	142	585	-
Surf scoter	171	489	3
Golden-eye	160	153	72
Black duck	17	58	214
Red-breasted merganser	-	49	-
Old squaw	54	47	2
American scoter	-	37	128
White-winged scoter	-	11	-
American merganser	-	2	-
Scaup	1	3	-
Green-winged teal	5	-	-
Unidentified	-	7	-
Total	4,314	5,130	2,687

A smaller total number of birds was observed in 1954, but it is likely that the difference in the dates at which time the survey was conducted accounts for this.

Table II. - Number of Nests Counted on Apple Island, June, 1954.

<u>Species</u>	<u>1954</u>
Eider	734
Black duck	29

No comparative data are available. Of the eider nests 8.9 percent had one or more eggs hatched. Average clutch size was between 4 and 5 eggs.

Table III. - Brood Survey, Riviere-du-Loup to Matane, July, 1954.

	<u>Broods</u>		<u>Young</u>		<u>Adults</u>	
	<u>1954</u>	<u>1953</u>	<u>1954</u>	<u>1953</u>	<u>1954</u>	<u>1953</u>
Riviere-du-Loup to Ste-Flavie	301	272	1,551	1,453	442	437
Ste-Flavie to Matana	54	46	458	411	99	94
Total	355	318	2,009	1,864	541	531

Ratio Young per Adult

1954	3.7
1953	3.5

Breeding success for Eiders along the St. Lawrence River was approximately the same in 1953 and 1954.

WATERFOWL BREEDING GROUND STUDIES, MARITIME PROVINCES,  
1954

George F. Boyer, Brian C. Carter and  
Jean Vaillancourt

Introduction

This marks the sixth consecutive year in which waterfowl breeding ground studies have been carried out jointly by the Canadian Wildlife Service and the United States Fish and Wildlife Service in the Maritime Provinces.

During this period much experimental work has been done, both as to method and types of habitat covered. At the same time it has been necessary to make certain that sufficient data are available to determine annual population trends.

The bulk of the spring aerial work was done by W. F. Crissey and Fred A. Glover of the U. S. Fish and Wildlife Service in a Grumman Widgeon. In addition, transects were run in the New Brunswick - Nova Scotia border region by George Boyer of the Canadian Wildlife Service.

The remainder of the aerial survey work was carried out by the Canadian Wildlife Service (Boyer) in the following aircraft:

Fleet Canuck (Chartered)	-- Pilot E. Woodside
Piper Pacer	-- Pilot Dave Hout
DeHavilland Beaver	-- Pilot Don Graham

Appreciation is expressed to Dr. G. W. I. Creighton, Deputy Minister, Department of Lands and Forests, Province of Nova Scotia, and Mr. G. L. Miller, Chief Forester, Department of Lands and Mines, New Brunswick, for the use of the latter two aircraft.

Ground studies were carried out during both the spring and summer periods by Messrs. Brian Carter and George F. Boyer, Canadian Wildlife Service. Banding with a Labrador retriever and by means of trapping was carried out by Boyer, assisted by Jean Vaillancourt, Student Assistant, Canadian Wildlife Service.

Methods

In 1953, in addition to the regular summer brood count, additional coverage was given to Prince Edward Island just prior to the opening of the hunting season. This year, this coverage was repeated and the New Brunswick-Nova Scotia border region study area was added to it. It is felt that the results of these surveys justify their continuance and that new regions such as the lower Saint John River Valley should be added. It is also felt that the boreal forest transects in southwestern Nova Scotia and

New Brunswick should be discontinued during the brood survey as waterfowl populations in this type of habitat are not sufficient to yield reliable data. More time should be spent in intensifying the coverage of areas where air coverage has proven successful.

In this report, only the results of aerial coverage have been used for comparison of annual trends, while ground studies have furnished data on brood sizes and numbers.

#### Weather and Water Conditions

The spring was about a week late after a fairly mild winter. The spring break-up was correspondingly retarded.

Although March started with unusually high temperatures, it ended with cold weather which persisted until about the third week of April.

On the whole, the spring was cold and backward and, in its early period, exceptionally dry. During the latter half of May the amount of precipitation rose greatly and many areas experienced very high rainfall causing totals for the month in both New Brunswick and Nova Scotia to average 30 percent above normal, some areas experiencing 100 percent excess. In Prince Edward Island, the excess was about 15 percent.

During June, precipitation varied greatly throughout the region ranging from deficiencies of 90 and 60 percent in eastern Nova Scotia and Prince Edward Island respectively to excesses of 150 percent in the southern half of New Brunswick and western Nova Scotia.

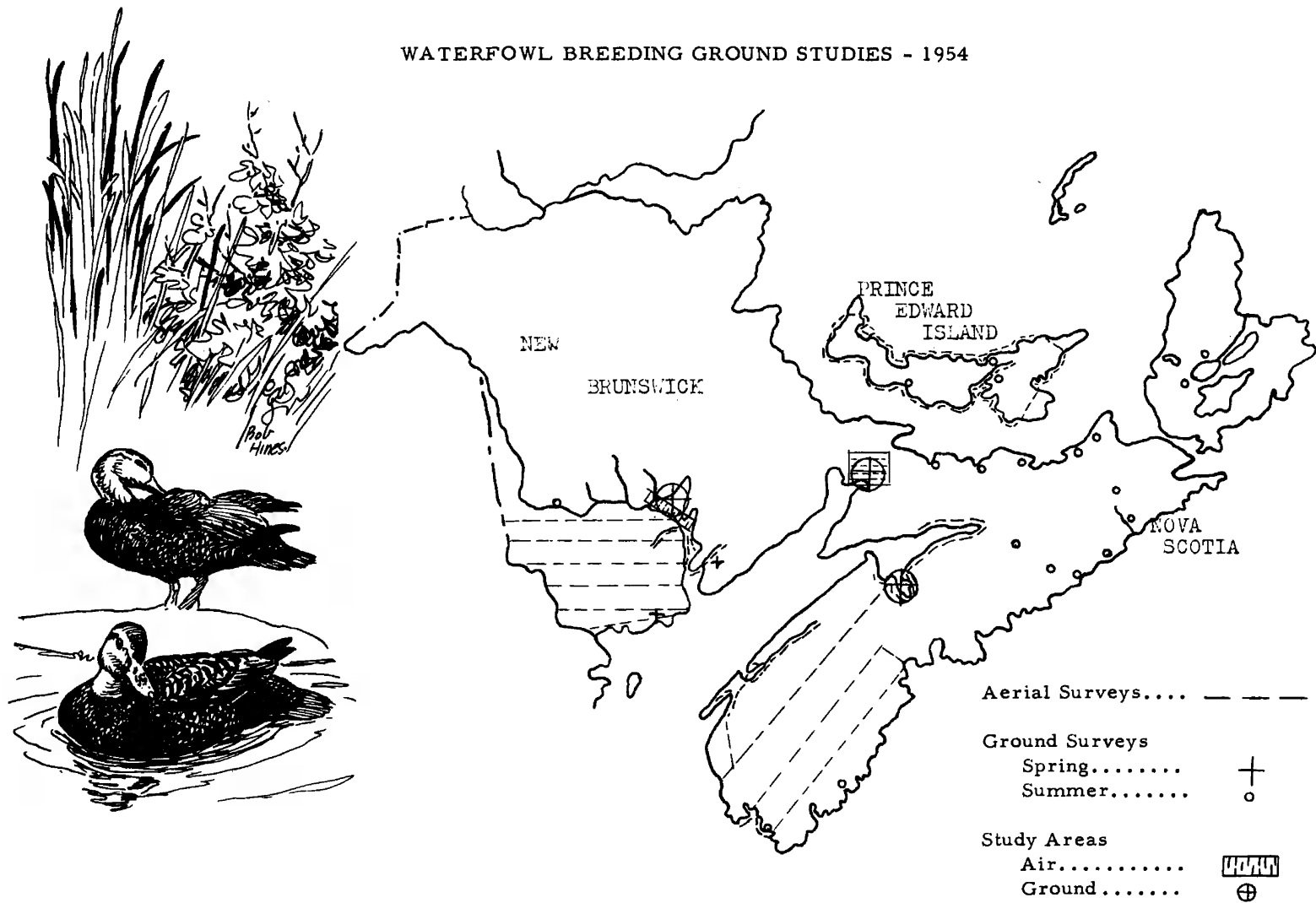
In July, again, precipitation varied greatly and was showery in nature, varying from 80 percent above normal in western New Brunswick and 100 percent in western Nova Scotia. Other parts of Nova Scotia showed a decrease of 40 percent while Prince Edward Island had an excess of about 50 percent.

Spring migration started at the normal time but the backward weather apparently caused large numbers of geese and brant to stay longer than usual.

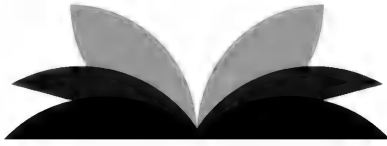
There is evidence that the unusually high precipitation in some areas caused considerable local nesting loss. The nesting season in general was delayed and protracted. Broods of black ducks were observed in southern Nova Scotia by the U. S. Aerial Team on May 12, an average date. A brood of black ducks about one week old was observed in the New Brunswick-Nova Scotia border area on August 20 and young flightless black ducks and pintails were banded in late August and early September. The main hatch of these two species was apparently a-wing in early August, however.

Late nesting species such as the blue-winged teal and ring-necked appear to have suffered heavy loss in the lower Saint John River area.

# WATERFOWL BREEDING GROUND STUDIES - 1954



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### Breeding Population Trends

Table I shows the spring breeding population trends as computed from aerial results. Due to an error in interpolation of coverage, the figures for the lower Saint John River study area were incorrect as listed in last year's report. The corrected figures are substituted here.

Table I. - Breeding Population Trends, 1952-1954.

	<u>Black Ducks</u>			<u>Favored Sporting Ducks</u>		
	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
Coverage						
Inland Transects						
(1) Boreal Forest	0.94	0.84	0.94	1.48	1.14	1.24
(2) Northeastern Wildlife Station (lower St. John River) special study area	5.46	6.68	13.70	10.50	13.29	23.16
(3) New Brunswick-Nova Scotia Border Region Study Area	-	-	4.00	-	-	7.95
(Birds lineal mile) Shoreline Counts	4.00	6.10	4.05	5.24	7.44	5.60

This table shows an increase over last year in the inland transects, particularly in the lower Saint John River study area. The shoreline counts show a decrease. This decrease can be partly accounted for by the drop in black ducks in coastal concentrations.

Success of the Season

Table II. - Comparative Aerial Brood Survey Data.

Species	1952	1953	1954
Black Duck			
Adults	875	1,516	894
Broods	60	46	55
Ring-necked Duck			
Adults	86	116	237
Broods	6	4	-
Golden-eye			
Adults	54	66	61
Broods	1	9	2
Others			
Adults	97	82	71
Broods	8	-	2
Total Game Ducks			
Adults	1,112	1,780	1,263
Broods	75	59	59

This table apparently indicates little change in the black duck situation if the early nesting season of last year, mentioned in the 1953 report, is taken into consideration. Golden-eye have remained much the same. It is felt that the increase in the count of adult ring-neck has some correlation with nesting loss previous to the date of the survey. The decrease in "others" is made up to a large extent by a smaller count of blue-winged teal---another late nesting species.

On the whole it would seem that there has been a drop in total brood production largely brought about by nest failures in late nesting species.

It must also be borne in mind that high water during the time of the summer brood survey may have affected the counts especially in areas such as the lower Saint John River where there is normally a good population of both blue-winged teal and ring-necks.

Brood Survival

Of a total of 112 broods tallied by ground survey parties this year, 72 were encountered in the lower Saint John River Valley. About half the blacks and all the golden-eyes listed in Table III came from this region.



In the case of ring-necks, the situation was different. Eight Class I broods and one Class II were counted in the lower Saint John River Valley, while the remainder were seen on various scattered lakes throughout Nova Scotia.

Table III. - Brood Sizes by Age Classes.

Species	Class I			Class II			Class III		
	No.	Total	Ave.	No.	Total	Ave.	No.	Total	Ave.
Black	5	40	8.0	19	126	6.6	9	53	5.9
Ring-necked	11	92	8.4	14	80	5.7	3	12	4.0
Golden-eye	11	108	9.8	16	77	4.8	1	4	4.0
Others	6	38	6.3	15	88	5.9	2	16	8.0
Total	33	278	8.4	64	371	5.8	15	85	5.7

Although only about one-half of last year's number of complete black duck broods was counted, it would appear that this year's average number per brood is considerably greater. Figures for 1953 show the averages as being 6.8, 5.5 and 4.9 for Classes I, II and III respectively.

#### Pre-Hunting Season Surveys

This year, aerial surveys were carried out on Prince Edward Island and the New Brunswick-Nova Scotia border transects during the last week of September.

Table IV. - Pre-Hunting Season Air Surveys.

Species	Prince Edward Island *		Nova-Scotia-New Brunswick Border Area*
	1953	1954	1954
Canada Goose	450	469	-
Black duck	8,900	10,792	952
Pintail	63	56	17
Green-winged teal	-	1,839	283
Blue-winged teal	-	205	252
"Teal"	250	-	-
Ring-necked duck	500	184	32
Golden-eye	30	-	-
Merganser	6,400	1,847	2
Eider	-	87	-
Scoters	400	289	-
Unidentified and Others	150	89	7
Total	17,143	15,857	1,545
Favored Sporting Species**	10,343	13,634	1,543

\* Same coverage as spring and summer - see map.

\*\* Excluding mergansers, scoters and eiders.

### Summary

Generally speaking, the brood season was protracted by high precipitation. In the lower Saint John River Valley, the wild rice crop appeared to be adversely affected by the high water and heavy winds. In many other areas, the food supply was very good and birds examined in late August and September were in very good condition.

Black Duck - In spite of the protracted brood season, numbers of this species compare favorably with last year.

Green-winged teal - Green-winged teal appear to be plentiful on Prince Edward Island but in poor numbers in many other areas.

Blue-winged teal - This species and the Ring-necked appear to have met with serious nesting losses due to high water. Their numbers are definitely down in the principal breeding areas. Scattered populations of ring-necks did well, however, in the inland lakes of Nova Scotia.

Other Species - The Pintail colony in the New Brunswick-Nova Scotia border area is steadily decreasing since 1948. It would seem that drainage and other agricultural work in this region is responsible. Wood Ducks are in about the same numbers. Golden-eye populations in the lower Saint John River Valley appear to be normal.

#### Banding Operations

This year, 1952 flightless ducks were banded in various parts of the Maritime Provinces by Boyer with the aid of a Labrador retriever during the period June 15 to August 27. A number of traps were operated during the period August 3 to September 15 in the New Brunswick-Nova Scotia border region by Boyer and Vaillancourt. Three hundred and forty-six ducks were banded during this operation.

Table V. - Banding Results.

#### Birds Banded Using Labrador Retriever

Species	Adult		Immature		Not Sexed	Total
	Male	Female	Male	Female		
Black duck	-	3	66	66	-	135
Pintail	-	-	4	1	1	6
Green-winged teal	2	-	2	2	-	6
Blue-winged teal	-	-	-	4	1	5
Total	2	3	72	73	2	152

#### Birds Banded During Trapping Operations

Mallard	-	-	-	2	-	2
Black duck	17	22	123	123	1	286
Pintail	-	1	6	17	-	24
Green-winged teal	4	-	4	7	-	15
Blue-winged teal	1	1	12	5	-	19
Total	22	24	145	154	1	346

## WATERFOWL BREEDING GROUND SURVEY IN THE ST. JOHN ESTUARY, 1954

Donald B. Reid

Introduction

This report is a summary of the results of the 1954 waterfowl breeding ground survey in the estuary of the St. John River, New Brunswick.

This is the tenth year in which the annual survey has been conducted by personnel of the Northeastern Wildlife Station, and because coverage and techniques are essentially the same as in previous years, the data are comparable. The survey was made this year by the writer, assisted by Barry Meadows.

Weather and Water Conditions

The waterfowl breeding season has been characterized by a general retarded phenology and by a cool, wet spring and summer.

The break-up of the ice on the St. John River occurred on April 12, compared with March 28 of 1953. The peak flood did not occur until April 24 and 25, compared with the five-year average of April 17, and with the peak occurring on April 3 in 1953. The water level of the river has been subjected to violent fluctuation throughout the summer, and excessive precipitation in the month of June probably resulted in the flooding of many late-nesting ducks--not only ringnecks but also puddle ducks attempting to renest for the second and third time.

The first black duck brood was not observed until May 31, although the average date for the appearance of broods on the study area is May 16.

Although the total mileage of slough shoreline on the study area was severely reduced in 1953 to 74.4 miles by dry, hot weather and by the filling of electric power reservoirs up river, it has this year been regained for a total of 108.5 miles. A comparison of the precipitation of the two years from June 1 to August 20 is presented in Table I. Although rainfall was less in July of 1954 than in 1953, this was compensated by cool, cloudy weather and by almost daily rainfall during early August. Indicative of the high water level is the statistic released by the Department of North Affairs and National Resources that stream flow of the St. John River during the month of July, 1954 was 213 percent above normal.

Table I. - Precipitation Comparison .

	<u>1953</u>	<u>1954</u>
June	2.00	6.42
July	6.29	3.14
August	1.37	3.32
(to Aug. 20 only)	<u>          </u>	<u>          </u>
Total	9.66	12.88

The high water level has not only contributed to the factors which have resulted in an apparent reduction of the local waterfowl population, but it has also flooded most of the wild rice beds which normally attract large numbers of migrating ducks during the hunting season.

### Brood Studies

Brood data were collected on the study area and adjacent water bodies from late May until August 24. The data are classified in Table II. A total of 30 broods and broody females was counted in contrast to 115 broods in 1953 and to 150 broods in 1952 with the same intensity of coverage. The totals are not corrected for possible duplicate counts. Decreased numbers of broods of all species were observed, and the figures are so small in most cases that hatching success and brood survival cannot be validly determined.

Table II. - Brood Data - 1953 and 1954.

Species	Class I		Class II		Class III		Broody Hens
	No. broods Observed	Av. Brood Size	No. broods Observed	Av. Brood Size	No. broods Observed	Av. Brood Size	
Black Duck							
1953	8	8.0	12	7.7	17	7.6	-
1954	1	9.0	2	9.5	3	6.3	2
B-w. teal							
1953	12	9.2	9	6.3	4	5.5	-
1954	1	7.0	-	-	-	-	-
G-w. teal							
1953	-	-	-	-	-	-	-
1954	-	-	1	4.0	1	1.0	-
Wood duck							
1953	12	8.2	3	7.0	3	5.7	-
1954	-	-	-	-	1	10.0	-
Ring-necked							
1953	18	7.9	8	5.4	1	5.0	-
1954	2	6.5	3	6.0	2	4.5	1
Golden-eye							
1953	14	7.0	5	5.4	4	5.8	-
1954	3	7.0	2	3.5	3	3.1	1
Mallard							
1953	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	1

Especially severe is the decreased numbers of blue-winged teal and wood duck broods. It is possible that the abnormally high water level has enabled broods to stay in cover in which they could not be found--notably the flooded dense maple peripheries of the water areas. Unusual numbers of broodless blue-winged teal and wood duck females, however, were tabulated. The only blue-winged brood observed throughout the period of study was a Class Ia brood on the late date of August 15.

It is believed that the retarded phenology combined with the recurrent flooding has resulted in an extremely poor brood season.

#### Census of Total Population

Total population counts are normally made on the study area on 14 scheduled trips during the period of July 15 to August 15. Due to inclement weather, the final census run in 1954 was not made until August 20. The late season, however, enables a comparison to be made with previous years.

Total population changes and percentage decreases from 1953 are tabulated in Table III. The over-all reduction in the total number of ducks from 1953 of 64 percent speaks for itself, especially when it is noted that the 1953 exhibited an over-all decrease of 40 percent from 1952. As with the broods, it is possible that the high water conditions enabled flying birds to take refuge in dense cover in which they could not be found and to scatter over areas which are normally dry, resulting in only a paper or theoretical decrease.

Table III. - Population Changes from 1953.

Species	Total Population		Percent Decrease from 1953
	1953	1954	
Black duck	738	400	-46
Blue-winged teal	363	5	-99.
Wood duck	122	14	-89
Ring-necked	65	28	-57
Green-winged teal	20	8	-60
Am. Golden-eye	79	35	-56
Mallard	2	4	-
Pintail	2	-	-
Red-breasted merganser	-	6	-
Unidentified	-	13	-
Total	1391	513	-64

Species composition of waterfowl on the study area for 1953 and 1954 is given in Table IV. Although the black duck exhibited a composition increase from 53 percent to 81 percent, this is obviously due to the greater population decreases of all other species.

Table IV. - Species Composition.

Species	1953 Percent	1954 Percent
Black duck	53	81
American Golden-eye	6	7
Ring-necked	5	6
Wood duck	9	2
Green-winged teal	1	2
Blue-winged teal	26	1
Mallard	1	1

Number of ducks per square mile of marsh on the study area since 1945 are given in Table V. Because the total population appears to be smaller this year than in any year since 1945, it is probable that the majority of hunters who would normally bag local ducks at the beginning of the season will be unsuccessful. It is possible that migrant ducks will provide good shooting in the estuary of the St. John River, but with the flooding of the wild rice and other choice food species, there will be little inducement for migrants to utilize this area.

Table V. - Duck Population Per Square Mile of Marsh.

<u>Year</u>	<u>Ducks per square mile</u>
1945	111.9
1946	53.5
1947	69.4
1948	84.1
1949	165.2
1950	157.6
1951	125.1
1952	153.3
1953	92.1
1954	33.9

### Comparison of Ground and Fish and Wildlife Service Aerial Surveys

The U. S. Fish and Wildlife Service has conducted aerial surveys to determine breeding population trends on the St. John River since 1952. The total numbers of ducks tabulated on the transects lying within the Northeastern Wildlife Station study area are given in Table VI, in comparison with the total waterfowl population as determined by the ground crews. It is evident that no correlation is possible at this time.

It is believed that the wide divergence of figures for 1954 is due to a late spring migration, that a large portion of the 3320 ducks counted by the aerial crew is representative of groups of migrating birds which did not remain in this area to breed.

Table VI. - Comparison of Ground and Fish and Wildlife Service Aerial Surveys

	<u>1952</u>	<u>1953</u>	<u>1954</u>
Fish and Wildlife Service Survey	1304	2328	3320
Ground Survey	2316	1391	513

### Conclusion

The 1954 waterfowl breeding season in the St. John estuary has been among the least successful since 1945.

The violently fluctuating river level is believed to have caused considerable nest losses, and the flooding has enabled successful broods as well as flying birds to utilize dense cover types where they could not be located.

All waterfowl species showed serious population decreases, with an over-all decrease of 64 percent from 1953. In view of the paucity of local birds and the flooding of wild rice beds which would normally attract migrants, the prospects for the hunting season are extremely poor.



## WATERFOWL BREEDING GROUND STUDIES, NEWFOUNDLAND, 1954

Leslie M. Tuck

Introduction

W. F. Crissey F. Glover of the U.S. Fish and Wildlife Service conducted an aerial reconnaissance of parts of Newfoundland on May 14 and 15. Data obtained are only preliminary and may be expected to be more meaningful after next season when it is hoped that additional work will have been done. On a transect covering 72 square miles between St. Johns, Gander and Stephenville, waterfowl densities per square mile were as follows: total ducks, 2.16; preferred sporting ducks, 1.61; Canada geese, 0.38. On a transect covering 72 square miles between St. Andrews Argentia and St. Johns, waterfowl densities per square mile were: total ducks, 0.72; preferred sporting ducks, 0.61; Canada geese, 0.33.

Ground studies were carried out this year in one small area bordering Swift Current on the northeast coast. It can best be described as a transition zone between the forested areas and muskey (barrens). Pimlott in his Newfoundland General Moose Range Classification May (1953, Transactions of the Eighteenth North American Wildlife Conference) describes it as part of the Marginal Range Zone. This zone has extensive muskegs and the forest cover, constituting less than 25 percent of the total area, is over 80 percent mature. The dominant trees in the forest association are black spruce and balsam fir with white birch generally occurring only as a minor stand component. This type of range occupies nearly half of the total area of the island. It is in this range that the bulk of the geese and, quite likely, most of the black ducks are raised. Golden-eye and ring-necked ducks, possibly requiring more forest cover, breed here only rarely. The mergansers occur here only rarely except near coastal estuaries. The scaup duck, although breeding in almost similar habitat on the coastal fringe of the south eastern Avalon Peninsula, has not so far been found in the interior.

Although investigations have been carried out in this specific area since 1952, it was only this year that any comparative ground surveys were carried out. This was possible by the capable assistant of Cst. C. W. Gilbert, Royal Canadian Mounted Police "B" Division, who worked with the author during the entire period. Special aerial transects in this area were also made possible through Royal Canadian Mounted Police co-operation. A total of 16 days was spent in the area during the periods, May 17-25, June 1-4, June 16-18. Ninety lineal miles, equivalent to 22 1/2 square miles, allowing a quarter of a mile for the width of each canoe strip, were sampled by canoe.

Adult waterfowl tabulated on these ground surveys totalled 422, of which 221 were Canada geese. Transects were carried out at approximately the same time morning and evening and were about one mile apart. These were repeated after an interval of several days in order to obtain information on the post-breeding black ducks and non-breeding geese, which seemed to become more numerous as the season advanced. Thus as much of each area as time permitted was covered at least twice

during the June visits and three times during the May studies. The results obtained, therefore, are not so much the actual population of the sample area in question as an index of the fluctuations of the numbers recorded under similar conditions over an extended period during the breeding season.

In the accompanying tables 5/2 means five pairs, two singels and an aggregate of seven birds in groups of three or more. No young birds are recorded. The data are recorded in tables I - III.

The Comparative Ground Density Table (Table IV) suggests the fluctuations in density that may occur at different periods of the spring as the season advances. However, if data derived from smaller samples in previous years can be considered comparable, it is clear that there are substantial increases in the breeding population of black ducks and Canada geese within the study area this year.

The first geese hatched in the Swift Current area this year on May 24 when an entire clutch of six walked off the nest. During the next week all six pairs under direct observation led off their young successfully. No loss of young geese up to June 18 was noted. Two broods were banded on June 16. Young black ducks were not observed until June 1, when a special drive brought out five broods varying in age from 24 hours to about two weeks. Before this date, a few very young black ducks were found dead but unmarked among the sedges. These may have gone astray and perished from exposure. The entire period during which the ground survey was carried out was consistently cold and wet.

On June 21, a bright, sunny day, aerial transects were made of a more extensive area in the Swift Current region. Fifteen transects 20 miles in length were run in the form of a grid over a 400 square mile section of the zone which included our study area as a focal point. These transects were approximately three miles apart and no counts were made on the turns. The aircraft maintained a ground speed of 100 mph. and a height of 150 feet; observations were made from one side only and covered a calculated 1/8 of a mile strip. Eliminating duplication, occurring at intersection on our grid, the actual area so censused is equivalent to 30 square miles.

Because of height, speed and the lateness of season, the statistics obtained on ducks on this aerial transect cannot mean much. Most of the ducks recorded were but a movement by the side of inside reed beds. Many, undoubtedly, were overlooked. On the other hand, geese, being in the open, were easy to "pick up" and therefore Table V is considered to give a fairly accurate picture of the geese in this area. All of the geese recorded on this flight were feeding or resting in shallow ponds, and not a single bird flushed during the survey. This might be an indication of an early moult by the non-breeders or it might indicate that the geese here are being conditioned to aircraft which they must experience nearly every day.

Table I. - Waterfowl Canoe Transects (Swift Current) - 1954.

Date	Lineal Miles	Square Miles	Black Ducks	Teal	Golden-eye	Mergansers	Canada Geese	Total	
								Ducks	Geese
May 17	2	.50	-	-	0/0 24	0/0 4	-	28	-
May 17	4	1.00	0/0 6	-	-	1/0 0	4/0 3	8	11
May 18	7	1.75	2/3 5	1/1 0	-	-	2/2 3	15	9
May 19	10	2.50	0/4 0	0/1 3	-	1/0 0	7/1 11	10	26
May 20	6	1.50	0/1 0	1/2 0	-	2/0 4	5/0 4	13	14
May 21	3	.75	1/0 0	-	-	-	2/0 0	2	4
May 22	4	1.00	-	0/4 0	-	-	2/0 0	4	4
May 23	7	1.75	-	1/0 0	-	1/0 6	2/0 0	10	4
May 24	8	2.00	1/0 0	1/3 0	-	0/0 3	5/1 3	10	14
May 25	3	.75	1/0 0	0/1 0	-	-	2/1 11	3	16
Total	54	13.50	5/8 11	4/12 3	0/0 24	5/0 17	31/5 35	103	102
Density per square mile:			2.15	1.70	1.77	2.00	7.55	7.63	7.55

Table II. - Waterfowl Canoe Transects (Swift Current) - 1954.

Date	Square		Black Ducks	Teal	Golden-eye	Mergansers	Canada Geese	Total	
	Lineal Miles	Miles						Ducks	Geese
June 1	3	.75	1/2 0	-	-	-	1/0 11	4	13
June 1	3	.75	0/2 0	-	-	1/0 0	2/0 12	4	16
June 1	1	.25	0/1 4	1/0 0	-	-	1/0 0	7	2
June 2	4	1.00	0/2 4	-	-	1/0 3	0/0 8	11	8
June 3	1	.25	0/1 0	-	-	1/1 0	0/0 8	4	8
June 4	4	1.00	0/3 0	-	-	1/0 0	1/0 13	5	15
Total	16	4.00	1/11 8	1/0 0	-	4/1 3	5/0 52	35	62
Density per square mile:			5.25	.50	-	3.00	15.50	8.75	15.50

Table III. - Waterfowl Canoe Transects (Swift Current) - 1954.

Date	Lineal Miles	Square Miles	Black	Teal	Golden-eye	Mergansers	Canada Geese	Total	
			Ducks					Ducks	Geese
June 16	4	1.00	0/5 4	-	-	1/0 3	2/1 0	11	5
June 16	4	1.00	0/3 0	0/3 0	-	-	1/0 7	6	9
June 17	4	1.00	0/3 0	-	-	0/0 3	3/0 3	6	9
June 17	3	.75	0/11 4	0/3 0	-	1/0 6	6/1 10	26	23
June 18	2	.50	1/0 0	-	-	-	2/0 0	2	4
June 18	3	.75	0/1 0	0/2 0	-	1/0 7	2/0 3	12	7
Total	20	5.00	1/23 8	0/8 0	-	3/0 19	16/2 23	63	57
Density per square mile:			6.6	1.6	-	5.0	11.4	12.6	11.4

Table IV. - Comparative Ground Densities - Swift Current.

	1952	1953	1954		
	May 21 - 23	June 6 - 7	May 17 - 25	June 1 - 4	June 14 - 18
Size of sample (Square Miles)	3	2	13.5	4	5
Black ducks per square mile	4.3	3.5	2.15	5.25	6.6
Green-winged teal per square mile	1.7	2.5	1.70	.50	1.60
Total ducks per square mile	7.0	8.5	7.63	8.75	12.6
Canada geese per square mile	8.0	11.5	7.55	15.50	11.4
Total density per square mile	15.0	20.0	15.18	24.25	24.0

Table V. - Aerial Transects of Swift Current Area - June 21, 1954.

(300 lineal miles or 30 square miles - 165 Canada geese observed of which 12 were pairs with broods.)

<u>Size of Group</u>	<u>Number Groups</u>	<u>Percentage of Grouping</u>
2	12	35%
3	2	6%
4	5	15%
5	5	15%
6	3	9%
7	1 )	
8	1 )	
9	2 )	
10	0 )	20%
11	0 )	
12	1 )	
13	1 )	
14	1 )	
<hr/>		
165	34	100%
Ratio of breeding birds to total (24:165)		14.5:100
Non-breeding individuals per square mile		4.7
Breeding pairs per square mile		.4
Total density per square mile		5.5

## WATERFOWL BREEDING GROUND SURVEY IN WASHINGTON, 1954

Henry A. Hansen, Wendell H. Oliver  
and Robert G. Jeffrey

### Introduction

Personnel contributing field data to this report are: Robert G. Jeffrey, Donald S. Galbreath, Henry A. Hansen and Wendell H. Oliver, Federal Aid Project of the Washington State Game Department, and Wayne C. Hanson, Wildlife Technician, Hanford AEC Project, Richland, Washington.

The 1954 waterfowl breeding ground survey represented the eighth consecutive year this inventory has been conducted in Washington. For study purposes the State has been divided into three units with a resident waterfowl biologist working in each area. The heavily forested part of the State west of the Cascade Mountains annually yields from seven to ten percent of the total waterfowl production, almost entirely mallards and wood ducks. The central irrigation areas, including the Yakima Valley and the embryo Columbia Basin Project, produce about 25 percent of the annual waterfowl crop. This area will increase in importance as new irrigation systems are completed in the Columbia Basin within the next few years. The remaining 65 percent of the waterfowl are produced in the scabland potholes areas of eastern Washington.

### Method of Sampling

Under all applicable conditions the standard one-fourth mile transect is used, but in some local situations, principally large irrigated tracts, modifications of the transect method of censusing are applied. Over-all, the same five to six percent of the total waterfowl habitat is inventoried each year so that direct comparisons should be possible.

### Weather and Water Conditions

In western Washington water conditions were good as usual. Habitat deterioration is seldom a problem in the high rainfall belt west of the Cascades. In south-central Washington water conditions were good, but in the potholes area of north-central and eastern Washington the habitat continued to deteriorate at an alarming rate. Of the potential of 10,000 potholes, attained in 1949 to 1951, only about 50 percent were available in the spring of 1954, and by late July these had evaporated until only about 20 percent were still usable. In checking precipitation charts from 1899 to date it appears that the present water level may be much more normal than during the period from 1949 to 1951 when unprecedented rain and snowfall hit eastern Washington.



### Breeding Population Trends

The total breeding population of ducks remaining after spring migration was roughly 30 percent less than in 1953, but with more favorable temperatures nesting success was enough better to boost the total waterfowl production slightly above that of 1953. There was some change in the relative abundance of the various species as indicated by the brood summary in Table I. Mallards, baldpates and pintails made gains at the expense of the teal group, scaup, redheads and ruddy ducks. Actually mallards reach 50 percent of the total production in 1953, indicating the exceptional success of the teal group and divers during the wet years in bringing the six-year average of mallards below 40 percent of the total production. Coots remained at about the level to which they dropped in 1953.

Table I. - Six-Year Summary and Comparison of 1954 Waterfowl Broods in Washington (Relative Abundance of Each Species in Parenthesis) .

Species	Six-Year Total of Broods Tallied		Broods Tallied
	1948	- 1953	1954
Mallard	3,253	(39.3)	365 (50.6)
B-w. & Cinn. teal	1,031	(12.5)	69 ( 9.6)
Redhead	605	( 7.3)	20 ( 2.8)
Gadwall	597	( 7.2)	48 ( 6.6)
Baldpate	569	( 6.9)	76 (10.5)
G-w. teal	448	( 5.4)	17 ( 2.4)
Shoveler	367	( 4.4)	27 ( 3.7)
Ruddy duck	366	( 4.4)	17 ( 2.4)
Pintail	346	( 4.2)	36 ( 5.0)
Scaup	220	( 2.8)	7 ( 1.0)
Wood duck	218	( 2.7)	18 ( 2.5)
Golden-eye	128	( 1.5)	15 ( 2.1)
Merganser	55	( 0.6)	5 ( 0.7)
Miscellaneous*	64	( 0.8)	2 ( 0.3)
Total	8,267		722

\* Harlequin, canvasback and ring-necked duck

Table II. - Average Brood Size by Age Classification, State Summary, 1954.

Species	Age Class I		Age Class II		Age Class III	
	No. of Broods	Average Size	No. of Broods	Average Size	No. of Broods	Average Size
Mallard	114	6.1	123	5.1	54	5.8
Baldpate	42	5.4	28	6.5	1	6.0
B-w. & Cinn. teal	40	7.1	6	6.3	3	5.0
Gadwall	22	7.0	17	5.3	1	4.0
Pintail	18	5.0	8	5.6	2	7.5
Shoveler	11	5.3	5	4.0	5	5.9
Redhead	14	7.3	3	6.3		
Ruddy duck	14	5.8	1	2.0		
Golden-eye	5	8.6	8	5.9	1	6.0
Wood duck	9	6.3	5	3.3		
Scaup	7	6.6				
G-w. teal	1	9.0	2	7.5	2	9.0
Merganser	2	7.5	1	4.0		
Unidentified	9	5.3	3	10.3		
Total	308	6.2	210	5.4	69	5.8

The average brood size for 587 broods classified was relatively good (5.9), considering the rapidly shrinking habitat as the rearing season progressed, and the late hatching date of many broods. There were many Class II broods, even among the usually early nesting mallards and pintails, as late as the last week of July. In normal seasons nearly half the mallard crop is on the wing shortly after the first of July. The average brood size by age classification is summarized in Table II.

The population index as totaled for the entire State by the field biologists working in the various areas shows a small gain over 1953. The 413,000 waterfowl, as indicated in Table III, will probably be a more "normal" average annual production than the high figure of 737,000 produced in 1950. A 55 year weather record shows no other period in which the total precipitation was as great as the four years 1949-1952. Apparently the water table in the past two summers has been receding to normal.

Table III. - Washington Waterfowl Production (Total End-of-Summer Population).

Area	1950	1951	1952	1953	1954
Western Washington	41,500	35,000	31,000	38,000	35,000
Central Washington	58,500	63,000	67,000	77,500	92,500
Eastern Washington	637,500	588,000	617,500	287,000	285,000
Total	737,500	686,000	715,500	402,500	412,500

Canada Goose Production

The island habitat of the basin Canada Goose on the Snake and Columbia River systems of south-central Washington was inventoried in early April for the fifth consecutive year following the pattern established in 1950. In addition to the 214 miles of river included in past surveys, a 51 mile unit of lesser importance farther up the Snake River was inventoried in 1954. This latter area (Unit V) supported a population of 1.17 pairs of geese per river mile compared with a population of 3.14 pairs on the lower 35 miles of the Snake River and 5.01 pairs per mile on the much larger Columbia River.

Unit II (see Table IV), that portion of the Columbia River included in the McNary Reservoir, lost most of its former nesting habitat late in 1953 when the water level was raised to the 350 foot level. Enough geese persisted in using the remnants of a few remaining islands, however, to give a density of 2.13 pair per river mile. What was once Mitchell Island (600 acres approximately) is now a narrow hummock of about one-eighth acre in size. Nine pair of geese nested on this ridge of land in 1954, but it is doubtful if such a density will be tolerated every year. Much, but not all, of the loss from the McNary impoundment was reflected in greater nesting densities on the Snake River islands (Unit IV). The remainder of the Columbia River above and below the McNary Reservoir (Units I and III) apparently absorbed none of the emmigration from the flooded area. An over-all loss of about 10 percent in resident pairs of geese was noted, but the total production was down only five percent due to better hatching success and slightly larger broods. The nesting success on 273 nests followed to completion was 73 percent, and the average size of Class II broods and older was 4.0 young.

The loss sustained on the Columbia River was probably accounted for in greater production in the scabland waterfowl habitat farther north in the State. Broods of geese were observed during the summer in areas not utilized previously. It is estimated that 2900 young geese were produced in the area that raised 3050 in 1953. In addition, about 175 were raised on the Snake River in the newly surveyed area for a total goose production of more than 3000 young on Washington's major river systems.

Table IV. - Canada Goose Population Density in South-Central Washington, 1951-1954.

Area	Total Miles of River Habitat	River Miles Inventoried				Pairs of Geese (Average per River Mile)			
		1951	1952	1953	1954	1951	1952	1953	1954
Unit I	40	40	40	40	40	243 (6.0)	311 (7.8)	304 (7.6)	299 (7.5)
Unit II	47	47	38	38	47	145 (3.1)	139 (3.7)	129 (3.4)	99 (2.1)
Unit III	92	37	65	10	35	208 (5.6)	303 (4.7)	49 (4.9)	213 (4.2)
Unit IV	35	19	35	35	35	42 (2.2)	91 (2.6)	99 (2.8)	110 (3.1)
Unit V	51				41				48 (1.2)
Total	265	143	178	123	198	638 (4.46)	844 (4.74)	578 (4.69)	769 (3.88)

Banding

During the summer quarter 511 ducks, geese and coots were banded, as summarized in Table V.

Table V. - A Summary of Waterfowl Banded, Summer 1954.

Species	Male		Female		Unclassified		Total
	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	
Mallard		1	2			204	207
B-w. & Cinn. teal			1			72	73
Shoveler						20	20
Pintail						14	14
G-w. teal						11	11
Gadwall						8	8
Coot						3	3
Baldpate						2	2
Lesser Scaup			1				1
Canada goose					30	142	172
Total		1	4		30	476	511

## WATERFOWL BREEDING GROUND SURVEY, OREGON, 1954

Chester E. Kebbe

### Introduction

Waterfowl breeding ground surveys in Oregon were carried on for the sixth consecutive year. Most of the work was carried on in the large marsh areas in the southeastern part of the State: Summer Lake, Warner Valley and the Klamath basin. Certain species of waterfowl nest throughout the State but, except for the large marshes of southeastern Oregon, the streams, potholes and small marshes are not of major importance. Collectively, however, they are vital to the overall waterfowl breeding survey picture. Personnel are not available for carrying on intensive investigations in such places.

### Methods of Sampling

All survey work was by the transect method. No aerial surveys were run. Sampling was done for continuity on the same areas as in previous years. No attempt has been made to count total numbers of breeding birds for the State or to estimate total reproduction.

### Weather and Water Conditions

During the spring the weather was cold with a great deal of overcast, retarding nesting of most species two to three weeks. Despite the late season, excellent reproduction was noted. Late in the summer many of the marsh areas were drying up due to little spring run-off and no summer precipitation.

### Breeding Population Trends

Counts of breeding pairs were again taken but the facts obtained are more confusing than of practical value. Mallards, the primary breeding species, nest throughout the spring months even when many of the migrants are still present. Other species which do not nest in the State or are rare nesters, were very abundant as late as June 1. Any breeding ground sample taken prior to that date was bound to be loaded with migrants, yet mallard broods were common prior to that time.

### Success of the Season

Canada goose production was down slightly in the Klamath basin but up in Warner Valley and at Summer Lake. Duck reproduction was normal.

Table I. - Comparison of Canada Goose Broods - Klamath Basin.

Sample Area	Square Miles	Number of Broods		Total Young		Average Young Per Brood	
		1953	1954	1953	1954	1953	1954
Spring Lake	3	15	5	69	21	4.6	4.2
Alkali Lake	2	6	3	29	12	4.8	4.0
Sprague River	18	52	23	221	94	4.2	4.1
Klamath River	10	123	155	550	723	4.5	4.7
Klamath Marsh	12	43	25	177	101	4.1	4.0
Hooper Tract and Seven Mile Marsh	8	9	9	40	46	4.4	5.1
Total	53	248	220	1086	997	4.4	4.3

Table II. - Average Brood Size by Age Classification in Eastern Oregon  
(2.5 square miles at Summer Lake).

Species	Females w/broods	Class I			Class II			Class III		
		No. Broods	No. Young	Average Size	No. Broods	No. Young	Average Size	No. Broods	No. Young	Average Size
Mallard	41	25	206	8.2	11	83	7.5	5	38	7.6
Cinnamon teal	28	18	129	7.2	7	55	7.9	3	20	6.7
Gadwall	63	42	343	8.2	21	158	7.5			
Redhead	52	46	308	6.7	6	37	6.1			
Shoveler	5	2	13	6.5	2	16	8.0	1	6	6.0
Ruddy duck	13	9	74	8.3	4	29	7.2			
Total Ducks	202	142	1,073	7.6	51	378	7.4	9	64	7.1
Canada goose	107	13	68	5.2	61	251	4.1	33	126	3.8

Table III. - Average Brood Size by Age Classification in Western Oregon  
(4.5 Square Miles at Sauvie Island).

Species	Females w/broods	Class I			Class II			Class III		
		No. Broods	No. Young	Ave. Size	No. Broods	No. Young	Ave. Size	No. Broods	No. Young	Ave. Size
Mallard	51				21	154	7.3	30	234	7.8
Wood duck	17	2	16	8.0	4	26	6.5	11	41	3.7
Cinn. teal	2							2	15	7.5
Total	70	2	16	8.0	25	180	7.2	43	290	6.7

#### Nesting Studies

Wood duck nesting studies were continued on Sauvie and Government Islands where 350 nest boxes were inspected. Total usage by all wildlife species amounted to 342 or 97 percent. Wood ducks used 261 of the nests or 74.6 percent.

#### Banding

During the period of June 1 through September 30 a total of 2402 ducks, 222 geese and 41 coots was banded. Some wood ducks banded in nest boxes prior to June 15 are also included.

Table IV. - Waterfowl Banded in Oregon - June 1 through September 30, 1954.

Species	Adult Male	Immature Male	Adult Female	Immature Female	Total
Mallard	388	440	189	267	1284
Pintail	300	167	133	90	690
Baldpate		1		1	2
G-w. teal	7	2	2	2	13
Gadwall		11		15	26
Shoveler				1	1
Cinn. teal		80	6	82	168
Wood duck		1	194		195
Redhead		11		12	23
Total	695	713	524	470	2402

	AM	IM	AF	IF	Unsexed Adults	Unsexed Immatures	Total
Canada Goose	37	4	31	-	51	99	222
Coot (Unclassified as to age and sex)							41

#### Summary

1. Excellent nesting success was apparent on most species.
2. A late spring retarded duck nesting two to three weeks.
3. A small spring run-off and lack of summer precipitation has resulted in many small marshes drying up.
4. A total of 2402 ducks, 222 geese and 41 coots was banded pre-season.



WATERFOWL BREEDING GROUND SURVEY, CALIFORNIA  
1954

A. W. Miller, A. E. Naylor and Frank M. Kozlik\*

Introduction

During the spring and early summer of 1954, the waterfowl breeding ground survey was conducted in essentially the same manner as in previous years throughout the principal waterfowl habitat of the State. By way of review it should be noted that under existing conditions the primary waterfowl production areas in California are in the northeast or "Great Basin" corner of the State, and in the Sacramento Valley.

The northeastern part of the State, including the Klamath Basin, contains numerous natural marshes and artificial water impoundments. The scattered distribution of these water areas with this great basin-type region makes it impractical to fly aerial transects. Instead, this entire area was given complete aerial coverage of all water and marsh areas to determine the total numbers of breeding waterfowl. To obtain further information on waterfowl production in this part of the State, a nesting study was conducted at Mountain Meadows (Walker Reservoir).

The Sacramento Valley is devoted to intensive agriculture with only a remnant of the once vast marshlands remaining. These remaining marsh and overflow lands are largely in private ownership and are controlled primarily by private duck clubs. Coupled with these remnants of marshland, the culture of rice as a commercial crop is responsible for a large portion of the waterfowl raised in this valley. From late April through the middle of September, over 290,000 acres of shallow stabilized water in the form of contoured rice fields are available to nesting ducks. Before the rice grows too high, this area can be ideally covered by aerial transect flights. Later in the season, however, brood counting and fall population counts are difficult to accomplish due to the dense cover growth and the inaccessible nature of these areas on foot. In contrast to northeastern California where a variety of waterfowl species nest, the primary species meeting in the Sacramento Valley is the mallard.

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\* Other personnel of the Federal Aid in Wildlife Restoration Project California 30-R, namely William Anderson, Philip H. Arend, Burton D. Collins and Eldridge Hunt cooperated in this study. Credit is also due Paul E. Steel and Thomas Horn of the Tule Lake National Wildlife Refuge for the gathering of the data on that area.

The remainder of the waterfowl produced in California are raised in scattered sections of agricultural and marsh habitat including tidal saltmarshes, stream channels, and artificial impoundments. These areas include the Suisun marsh, Sacramento-San Joaquin river delta, the Grasslands of the San Joaquin valley and the North Bay. In many cases, production is high on these areas, but is limited in significance by the relatively small size of the area and the amount of water. A nesting survey was carried on in the Grasslands.

#### Weather and Water Conditions

The winter was relatively mild and the spring migration began the latter part of February. Most of the Pintail and geese left the Valley by the middle of March or the first of April. However, Lesser Canada geese and some cacklers and white-fronted geese did not leave Northeastern California until after the first of May. Canada geese began nesting early in March and the first broods were seen April 2 at the Tule Lake National Wildlife Refuge. Although winter precipitation was considerably lighter than the previous three years, it was still near normal in most regions of the State.

#### Scope and Methods

Fundamentally the survey consists of an aerial census of the pairs of ducks present on the breeding grounds during the last half of May and the first half of June. Production is based on the number of pairs found, the relative nesting success, and the average brood size on each area. The latter two factors require considerable ground work and it is not always possible to conduct such surveys on each unit every year. An attempt is made to keep the data current on major areas,

Goose production in California is confined to the northeastern section and involves only Canada geese. Since the goose nesting season is over when the regular survey flights are made in June, a special survey was made in early May to record the number of breeding pairs. The June survey was then used to determine production and fall populations.

Insofar as possible the areas covered, census routes traveled, and methods employed have been duplicated from the pattern established in previous years. Census flights were made with a pilot and two observers. On some flights a different observer was used than in previous years, but in all cases at least one of the observers had flown the census route before.

All of the aerial transects were flown at elevations of 150 feet at speeds of 85 to 90 miles per hour with the two observers covering a ground strip  $1/8$  mile wide on either side of the airplane. Under these conditions experienced observers can accurately record species and sex of those ducks exhibiting divergent sex characteristics as well as note whether the birds occurred as pairs, singles, or groups of males.

### Results

For the following areas comparable data have been gathered in all four years. A standard pattern of reporting has been used to include pertinent facts with reference to individual areas. On a sampling basis, coverage of the entire State production can be considered as essentially complete; thus figures are shown as actual numerical estimates of total numbers rather than as ducks per square mile, etc. Data on individual areas studied are summarized with such remarks as are pertinent. "Total fall population" includes resident adults plus locally reared young.

#### 1. Sacramento Valley

- a. Area - 2400 square miles.
- b. Type - Agricultural land including 290,000 acres of rice, plus managed refuges and gun clubs.
- c. Coverage - 2 1/2 percent aerial 1951, 4 1/2 percent aerial in 1952, 2 1/2 percent 1953 and 1954.
- d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1951	1952	1953	1954	1951	1952	1953	1954
Mallard	29,240	34,300	25,930	20,240	150,000	171,500	90,750	86,020
Pintail	0	300	200	80	0	1,500	700	340
Gadwall	200	600	600	280	1,000	3,000	2,100	1,190
Cinn. teal	400	1,700	1,160	520	2,400	8,500	4,060	2,210
Redhead	0	60	70	40	0	300	240	170
Ruddy	0	0	0	40	0	0	0	170
Shoveler	80	40	240	40	400	200	840	170
Others	0	0	0	10	0	0	0	40
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Total	29,920	37,000	28,200	21,250	153,800	185,000	98,690	90,310
Coots	1,720	4,500	8,080	8,240	8,000	22,500	28,280	41,200

- e. This area shows a decrease of 25 percent in nesting pairs of ducks and 8 percent decrease in the total fall population. The breeding population of coots remained about the same, but the fall population showed a 45 percent increase. Production of both ducks and coots was probably better this year because there was less spraying of dieldrin than in 1953.

#### 2. Suisun Marsh

- a. Area - 140 square miles.
- b. Type - Natural tidal marsh, gun clubs and agricultural land.
- c. Coverage - Aerial: 5 percent 1951, 1952, 1953, 1954.
- d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1951	1952	1953	1954	1951	1952	1953	1954
Mallard	980	3,640	1,400	500	5,000	18,100	7,000	2,480
Gadwall	340	480	200	100	2,000	2,500	1,000	500
Cinn. teal	100	580	100	100	550	2,900	460	480
Others	20	180	140	90	100	900	700	450
Total	1,440	4,880	1,840	790	7,650	24,400	9,160	3,910
Coots	0	180	120	100	0	900	600	500

- e. Figures this year indicate a 57 percent decrease in both nesting ducks and in the fall population. Coots showed an 8 percent decrease in breeding pairs and a 17 percent decrease in the fall population. This small area was rechecked with complete coverage and practically the same results were obtained. No explanation can be given for the decreased populations.

### 3. North San Francisco Bay

- Area - 30 square miles
- Type - Tidal saltmarsh, gun clubs, river delta pasture land.
- Coverage - Aerial 15 percent, 1951, 1952, 1953, 1954.
- Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1951	1952	1953	1954	1951	1952	1953	1954
Mallard	560	480	440	400	2,700	2,400	2,200	2,000
Pintail	7	30	140	20	35	150	700	100
Gadwall	73	130	90	140	350	650	470	700
Cinn. teal	0	30	10	30	0	150	30	150
Ruddy	0	60	90	120	0	300	270	600
Shoveler	7	10	30	50	40	50	150	290
Others	0	110	80	0	0	550	240	0
Total	647	850	880	760	3,125	4,250	4,060	3,840
Coots	0	0	250	420	0	0	1,250	2,100

- e. This area shows a slight decrease (5 percent) in the fall population of ducks, while the coot population showed an increase of 68 percent.

## 4. North San Joaquin Valley (Grasslands)

- a. Area - 150 square miles.
- b. Type - Gun clubs and flooded pasture lands.
- c. Coverage - Aerial 25 percent 1951, 1952, 1953, 1954.
- d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1951	1952	1953	1954	1951	1952	1953	1954
Mallard	1,703	2,070	1,420	2,170	8,500	10,350	4,420	6,950
Pintail	100	30	80	105	500	150	330	290
Gadwall	192	280	180	310	1,000	1,400	570	870
Cinn. teal	173	340	180	235	900	1,700	620	530
Redhead	88	20	60	25	450	100	190	80
Ruddy duck	28	0	30	20	160	0	100	60
Shoveler	12	50	200	10	70	250	640	30
F. T. duck	0	0	0	5	0	0	0	20
Others	0	0	0	0	0	0	0	0
Total	2,295	2,790	2,150	2,880	11,580	13,950	6,870	8,830
Coots	724	960	3,900	250	3,500	4,800	10,770	1,370

- e. Remarks: Breeding pairs of ducks increased 34 percent and the fall population increased 29 percent. The ruddy duck, shoveler and coot are late migrants. Usually these migrants are still present in this area when the count is made for breeding pairs (May 20). They leave by the middle of June, and thus do not contribute to the production of this area. For this reason they are not included in this report, but were recorded in the preliminary report.

## 5. South San Joaquin Valley

- a. Area - not determined.
- b. Type - Flooded lake bottoms, river channels and agricultural land.
- c. Coverage - Aerial. Variable (10 percent to complete coverage in 1952 and 1953). In 1954 only 5 percent coverage on rice land and complete coverage on remainder.
- d. Production summary:

Species	Estimated Total Nesting Prs.			Total Fall Population
	1952	1953	1954	1954
Mallard	1,700	2,570	2,935	8,100
Pintail	40	190	80	220
Gadwall	290	50	160	440
Cinnamon teal	190	200	220	610
Redhead	70	30	50	140
Ruddy duck	0	140	5	20
Shoveler	10	30	30	80
Fulvous Tree duck	20	10	5	20
Others	0	0	0	0
Total	2,320	3,220	3,485	9,630
Coot	2,600	4,700	400	2,000

- e. Remarks: An increase of 8 percent in breeding ducks and a decrease of 90 percent in nesting coots is indicated. Waterfowl habitat in this area now consists of rice land around the Mendota Pool (Dos Palos to Helm) and pasture land east of the San Joaquin River in Merced County. Tulare, Buena Vista and Hacienda Lakes will probably never flood again due to the construction of storage reservoirs on the Kern and the Kings Rivers. Since the area covered this year will probably continue to produce ducks in future years, production figures have been included for the first time.

6. Northeastern California

- a. Area - Not determined.
- b. Type - Natural marshes, lakes and artificial impoundments.
- c. Coverage - Aerial, complete 1951, 1952, 1953, 1954.
- d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1951	1952	1953	1954	1951	1952	1953	1954
Canada goose	2,000	2,560	2,300	2,570	13,350	14,200	12,830	14,300
Mallard	4,460	7,120	5,430	5,410	23,540	50,980	32,620	38,800
Pintail	1,970	2,440	1,130	1,280	7,190	16,230	6,380	8,200
Gadwall	1,475	820	710	610	9,250	6,810	4,710	5,000
Cinn. teal	1,150	770	630	640	5,400	4,840	4,130	4,500
Redhead	875	430	700	710	4,770	2,410	5,200	5,400
Ruddy duck	295	100	190	180	1,500	440	1,260	1,100
Shoveler	235	250	140	230	1,500	1,880	630	1,500
Scaup	150	140	130	60	880	1,010	1,040	400
Others	250	150	230	160	1,990	800	1,230	800
Total Ducks	10,790	12,220	9,290	9,280	56,020	85,400	57,200	65,700
Total Coots	1,710	1,650	3,600	2,800	12,800	9,770	21,050	16,800

- e. Remarks: This area had a 12 percent increase in breeding pairs of Canada geese and a similar gain in the total fall population. The breeding duck population remained stable, but better production increased the fall population by 15 percent over 1953. Breeding coots were down 22 percent, and the total fall population decreased 20 percent from 1953.

7. Klamath Basin (Tule Lake, Clear Lake, and Lower Klamath Refuges)

- a. Area - 35,000 acres of water and marsh plus surrounding agricultural lands.
- b. Type - Great Basin. Natural and managed marsh area.
- c. Coverage - Ground observation 1951, 1952, aerial, 1953, ground and aerial in 1954.

## d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1951	1952	1953	1954	1951	1952	1953	1954
Canada goose	1,500	640	550	725	11,500	5,040	4,730	6,770
Mallard	3,600	2,270	3,190	4,040	27,500	18,600	20,000	30,670
Pintail	400	440	360	810	3,400	3,230	2,000	5,090
Gadwall	6,000	3,200	4,210	3,850	50,000	27,200	45,800	33,530
Cinn. teal	2,000	1,210	1,165	1,950	18,000	9,100	8,640	13,990
Redhead	4,800	2,800	2,900	5,580	45,000	22,100	28,930	47,510
Ruddy duck	5,000	1,350	1,500	2,860	38,000	8,600	8,100	21,410
Shoveler	600	760	285	450	6,000	6,080	1,370	3,340
Scaup	1,000	150	105	90	9,000	1,230	620	870
Others	550	120	75	220	5,250	850	540	1,120
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Total Ducks	23,950	12,300	13,790	19,850	202,150	96,990	116,000	157,530
Total Coots	6,000	3,900	4,500	3,900	40,000	24,000	27,300	30,500

- e. Remarks: On this important area breeding Canada geese showed an increase of 32 percent, while the total fall population increased 43 percent over 1953. Pairs of breeding ducks increased 44 percent and the total fall population increased 36 percent over 1953. The breeding coot population was down 13 percent, but the fall population showed a 12 percent increase over 1953.

8. Statewide Trend.

A comparative summary of nesting pairs of waterfowl for the past four seasons together with final fall population including young plus resident adults is shown in the following table. These figures for each year have been derived from the preceding tables. In almost all cases the figures shown for "nesting pairs" are more accurate than those indicating "total fall population." The 1952 and 1953 figures are not directly comparable with the 1951 figures since basic changes were made in the methods of obtaining data from Tule Lake and Lower Klamath refuges in 1952.



Species	Estimated Total Nesting Pairs				Total Fall Population			
	1951	1952	1953	1954	1951	1952	1953	1954
Canada goose	3,500	3,200	2,850	3,305	24,850	19,240	17,562	21,070
Mallard	40,543	51,580	40,380	35,695	217,240	271,930	156,990	175,020
Pintail	2,477	3,280	2,100	2,375	11,125	21,260	10,110	14,240
Gadwall	8,280	5,800	6,040	5,450	63,600	41,560	54,650	42,230
Cinn. teal	3,823	4,790	3,435	3,695	27,250	27,040	17,910	22,470
Redhead	5,763	3,380	3,760	6,405	50,220	24,810	34,560	53,300
Ruddy duck	5,323	1,510	1,950	3,225	39,660	9,340	9,730	23,360
Shoveler	934	1,120	925	810	8,010	8,460	3,630	5,410
Scaup	1,150	290	235	150	9,880	2,240	1,680	1,270
Others	820	610	545	490	7,340	3,250	2,740	2,450
Total Ducks	69,042	72,369	59,370	58,295	434,325	409,890	292,000	339,750
Total Coots	10,154	13,790	25,150	16,110	64,300	61,970	89,250	94,470

- e. Remarks: The accumulated data indicates that the Canada goose breeding population was up 16 percent, while the fall population increased 20 percent over 1953. The increased number of Canada geese is encouraging as it breaks the gradual decline that was recorded in past years. Band returns from the hunting season indicate that fewer resident geese were harvested last fall than in other years, which might have resulted in the increased number of breeders this spring.

The breeding duck population remained about the same as last year, but the fall population increased 16 percent over 1953.

The nesting coot population was down 36 percent, but good production resulted in a 6 percent increase in the fall population over 1953.

#### Banding

During the summer and fall 19,793 ducks, 2,924 Canada geese and 768 coots were banded on seven major waterfowl areas prior to September 15. Species, sex and age data are presented in the following table.

Table I. - California Waterfowl Banding Summary, June 15 to September 15, 1954.

Species	Ad. M.	Im. M.	Ad. F.	Im. F.	Imm.	Uncl.	Total
Mallard	1330	2487	556	1623			5996
Gadwall		157	1	94			252
Pintail	6190	2548	1668	1536			11942
Baldpate	5			1			6
Green-winged teal	5	13	1	8			27
Cinnamon teal	1	193	22	232			448
Shoveler		1					1
Wood duck		3		2			5
Fulvous tree duck		2		1			3
Redhead	8	492	17	460			977
Canvasback	1						1
Lesser scaup		26	1	51			78
Ruddy duck	2	14	6	34			56
Coot					446	322	768
Hood merganser				1			1
Canada goose	915		879		1122		2924

### Nesting Studies

Waterfowl nesting studies were carried on at Mountain Meadows (Walker Reservoir) in northeastern California, and in the Grasslands of the north San Joaquin Valley. Results are briefly summarized below.

	<u>Mountain Meadows</u>		<u>Grasslands</u>	
	<u>Ducks</u>	<u>Coots</u>	<u>Ducks</u>	<u>Coots</u>
Number of nests found	711	67	427	19
Hatching success	58%	96%	10%	63%

## WATERFOWL BREEDING GROUND SURVEY, NEVADA 1954

Fred E. Wright

### Introduction

The 1954 waterfowl breeding ground survey is the fourth year that the key sample areas have been covered, however, the number of sample areas and the amount of time that has been spent on the production survey has decreased each year.

### Methods

The sample areas are checked by boat, by car, or on foot, and an attempt is made to check each area two to three times during the period, June through August. No aerial transects were run. To date it has not been possible to adequately sample the State to determine estimated total production.

### Weather and Water Conditions

Weather conditions were not adverse to waterfowl production during the period May through August. In all trend areas there was less water available and the snow water runoff was 50 to 75 percent of normal in the main drainage basins. All reservoirs checked were lower this year with the most critical draw-down occurring across the northern part of the State. Water conditions in west-central Nevada, while below last year, did not adversely affect production this year; but a poor snow pack this winter will mean less nesting habitat next year.

### Duck Production

Across northern Nevada, the drought has taxed the water supply to where many of the reservoirs were nearly dry by the latter part of the summer and many streams were dry along certain reaches. The net result was a 43 percent drop in the number of young recorded on the reservoir check areas. The Sheldon National Antelope Refuge shows a 54 percent drop in the number of broods seen. Ruby Lake National Wildlife Refuge reports that water levels were good at the beginning of the period but deteriorated rapidly during the latter part of summer season. Production is reported as normal for the Ruby Lake area, however, Franklin Lake, just to the north of Ruby Lake was highly productive last year but was about totally dry this year, as it is a highly intermittent water area.

Table I. - Totals of all Brood Classes by Species for 1953 and 1954 on Reservoir Trend Areas for a Comparative Period.

Species	Broods		Young		Average	
	1953	1954	1953	1954	1953	1954
Mallard	14	12	82	77	5.86	6.42
Pintail	12	9	71	37	5.91	4.11
Gadwall	14	15	122	93	8.73	6.2
Cinnamon teal	12	8	82	51	6.85	6.38
Green-winged teal	5	3	42	12	8.4	4.0
Scaup	9	-	72	-	8.0	-
Baldpate	1	-	5	-	5.0	-
Total	67	47	476	270	7.12	5.75

43.2 percent decrease in number of young

30.0 percent decrease in number of broods

The 43 percent drop in production on the reservoir check areas represents a 50 percent decrease from 1950 the initial year of reservoir coverage. The fall flights will find little water to hold them in the northern part of the State and could be the reason for the larger fall populations showing up in the west-central part of the State.

Production in the west-central part of the State is up about 100 percent over last year or about 50 percent over 1951 the initial survey year for this area. Water conditions have been ideal in that a gradual draw-down of water levels through evaporation eliminated nest flooding.

Table II. - Nesting Pair Count for Stillwater Wildlife Management Area, 1953 and 1954.

Species	1953	1954
Canada Goose	30	21
Mallard	801	430
Gadwall	678	358
Baldpate	52	4
Pintail	83	105
Green-winged teal	6	9
Blue-winged teal	12	0
Cinnamon teal	1934	858
Shoveler	38	50
Ruddy	165	134
Redhead	1028	1262
Total	4797	3210
Coot	4674	3700

Table III. - Estimated Waterfowl Production on the Stillwater Wildlife Management Area, 1953 and 1954.

Species	1953	1954
Canada goose	25	48
Mallard	951	1996
Gadwall	1224	1826
Baldpate	180	17
Pintail	81	461
Green-winged teal	-	45
Blue-winged teal	18	-
Cinnamon teal	2451	4243
Shoveler	-	226
Redhead	2621	5868
Ruddy	118	496
Total	7644	15,178
Coot	1528	10,080

The Humboldt-Toulon Sink south of Lovelock was covered again for the second season. The water level was down compared to the previous year; however production was up by 21 percent. In July the maximum water depth was about two feet and by August, since there was very little inflow, the maximum depth had dropped to around one foot.

Table IV. - Totals of all Brood Classes by Species for 1953 and 1954 on Humboldt-Toulon Sink.

Species	Broods		Young		Average	
	1953	1954	1953	1954	1953	1954
Mallard	2	8	12	65	6.0	8.12
Pintail	-	1	-	4	-	4.0
Gadwall	1	3	9	21	9.0	7.0
Cinnamon teal	1	1	18	13	18.0	13.0
Green-winged teal	-	1	-	3	-	3.0
Redhead	24	24	176	151	7.34	6.3
Ruddy	1	-	5	-	5.0	-
Total	29	38	220	267	7.6	7.04

31.0 percent increase in number of broods

21.4 percent increase in number of young

### Goose Production

Goose production and the molting population within the State remained at practically the same level as last year. At Washoe Lake 325 young were counted this year compared to 363 young last year. The average brood last year consisted of 3.86 young birds; and this year the average was 4.9 birds.

There was no significant change in the molting population using Pyramid Lake as to number or location on the lake. A total of 2627 geese were recorded last year around the lake and 2450 geese this year. A cooperative goose banding operation in June with the California Fish and Game waterfowl personnel netted 297 Pyramid Lake geese.

### Summary

Water conditions were very poor in northern Nevada and good in west-central Nevada.

Duck production in northern Nevada was down by about 43 percent from last year, but was up in the west-central part of the State by about 100 percent.

There was little change in the status of nesting and molting goose populations.

A total of 416 ducks and 35 geese was banded during the summer.

### Banding Summary

Species	AM	IM	AF	IF	LocM	LocF	Unclass- ified	Total
Mallard	5	3	1	1	-	-	-	10
Gadwall	-	-	1	1	-	-	-	2
Baldpate	3	2	-	-	-	-	-	5
Green-winged teal	27	11	2	10	-	-	-	50
Cinnamon teal	-	8	1	5	-	-	-	14
Shoveler	19	4	1	2	-	-	-	26
Pintail	134	43	66	33	-	-	-	276
Redhead	1	9	4	6	-	-	13	33
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Total	189	80	76	58	-	-	13	416
Canada geese	1	-	4	-	12	18	-	35

## WATERFOWL BREEDING GROUND SURVEY, IDAHO, 1954

Robert L. Salter

### Introduction

Most of the data presented here were gathered under Federal Aid Project 96-R-5 with biologists Charles S. Blake, Elwood G. Bizeau, Charles D. Haynes and Hugh A. Harper, Jr., responsible for the collection of material in Districts Four, Five, Three and One and Two, respectively. Mr. F. Sheldon Dart, Refuge Manager, Deer Flat National Wildlife Refuge, again cooperated in conducting the Homedale goose nesting and banding work. Mr. C. G. Wolf, Refuge Manager, Minidoka National Wildlife Refuge, assisted in the goose banding at the refuge. Mr. Wallace Leonard, Refuge Manager, Camas National Wildlife Refuge, participated in the brood counts taken on the refuge and in the Canada goose banding done there. Mr. James S. Cromwell, Game Management Agent, assisted in the Homedale nesting and banding studies. Many Idaho Fish and Game Department employees, including conservation officers, refuge managers and biologists, cooperated in the banding and brood count work.

### Weather and Water Conditions

The winter of 1953-54 in Idaho followed the pattern set the previous year in being quite open and mild. Although there was a slight setback in March, temperatures in April and most of May were above normal. The last 10 days of May and most of June were characterized by below average temperatures and above average rainfall. July was about normal and August was cool with above average precipitation in the northern section of the State.

Winter and spring precipitation was ample to fill most reservoirs and insure summer water. An above average snowpack coupled with a hot spell brought on a serious flood along the Kootenai River in Boundary County. Waterfowl production here is slight and this is the only area where flooding occurred to any degree.

### Migration

The 1954 winter inventory showed a 19 percent increase in ducks and a 37 percent increase in geese over the previous year. This was believed to be due primarily to the mild weather and abundance of open water. Most of these birds left the State soon after the inventory, however, and the late winter population was no larger than usual.

The spring migration passed through the State at about the same rate as 1953. Some observers believed the numbers were slightly larger than last year.

### Goose Nesting Survey

The results of this year's goose nesting survey are shown in Table I. The poor hatching success recorded at Blackfoot Reservoir was due largely to nest depredations by badgers. A comparison with previous years as shown in Table II indicates that Canada goose production was very close to that of 1953.

### Brood Trend Routes

For the second year duck brood production trend routes were run in Districts Four and Five. These routes were covered in early July and all broods recorded. In late July they were run again and only Class I broods were counted. The total broods for the two trips are the trend figures listed in Tables III and IV. Duck production on the trend routes was down in both districts, 14 percent in District V and 46 percent in District IV. The heavy reduction in District IV was largely in redheads and was believed due to extreme fluctuations in the waters sampled.

Statewide waterfowl brood counts are given in Table V.

### Banding

In the Canada goose banding program this summer emphasis was placed on catching as many "local" birds as possible. The results are shown in Table VI.

Table I. - Results of Canada Goose Nesting Survey, Idaho, 1954.

	Glenns Ferry	Homedale	Blackfoot Reservoir	Island Park Reservoir
No. of nests found	34	216	132	42
No. of nests terminated	34	216	132	42
No. of successful nests	9(26.5%)	169(78.2%)	78(59.1%)	36(86%)
No. of unsuccessful nests	25(73.5%)	47(21.8%)	54(40.9%)	6(14%)
Average clutch - successful nests	4.9	5.7	5.0	5.5
Average hatch - successful nests	4.6	5.5	4.5	4.1



Table II. - Comparison of Goose Production on Four Areas, 1952-1954.

	Glenns Ferry	Homedale	Blackfoot Reservoir	Island Park Reservoir	Total
<b>Number Nests Found</b>					
1952	24	208	103	16	351
1953	24	250	121	44	439
1954	34	216	132	42	424
<b>Number Nests Hatched</b>					
1952	16	103	75	12	206
1953	11	180	74	36	301
1954	9	169	78	36	292
<b>Average Hatch</b>					
1952	5.1	4.7	4.7	4.0	4.7
1953	5.4	5.0	4.8	4.6	4.9
1954	4.6	5.5	4.5	4.1	5.1
<b>Estimated production</b>					
1952	82	484	352	48	966
1953	60	900	355	166	1481
1954	41	930	351	148	1470

Table III. - Brood Count Trend Routes - District Four - 1953-1954.

Trend Route	Year	Number of Broods by Species						Total
		Mallard	Redhead	Ruddy	Gadwall	Pintail	Baldpate	
North Side Canada	1953	13	11					24
	1954	4	4					8
Murtaugh Lake	1953	5	7	8				20
	1954	5	6	7				18
Snake River	1953	4	40	3	3			50
Milner-Burley	1954	4	9		8			21
Milner-Canal	1953	25				2	2	29
	1954	18	1					19
Total	1953	47	58	11	3	2	2	123
	1954	31	20	7	8	0	0	66

Table IV. - Brood Count Trend Routes - District Five - 1953 - 1954.

		Number of Broods by Species												Total Broods All Species
Trend Route	Year	Mallard	Pintail	Baldpate	Gadwall	Shov- eler	G-w. teal	B-w. teal	Canvas- back	Redhead	Ruddy	Scaup	Unident- ified	
Camas														
NWR	1953	9	4	1	7	1	1	1	-	17	9	4	9	63
	1954	22	4	-	9	--	1	2	1	4	3	8	10	64
Camas														
Creek	1953	11	16	9	3	3	1	-	1	13	-	2	3	61
	1954	11	6	5	4	1	2	1	-	2	-	3	1	36
Teton														
River	1953	7	-	7	1	-	1	2	-	6	-	-	2	26
	1954	2	-	1	6	-	-	-	-	7	-	-	2	18
Blackfoot Reser-														
voir	1953	14	6	4	28	-	1	-	-	-	-	12	13	78
	1954	14	4	4	33	-	1	5	-	5	-	8	4	78
Total All	1953	41	26	21	39	4	4	3	-	36	9	18	27	228
Routes	1954	49	14	10	52	1	4	8	1	18	3	19	17	196

Table V.- Idaho Brood Counts - Summer, 1954.

Species	Class I			Class II			Class III		
	No. Broods	No. Young	Ave.	No. Broods	No. Young	Ave.	No. Broods	No. Young	Ave.
Mallard	185	1158	6.3	74	412	5.6	62	346	5.6
Gadwall	68	471	6.9	12	89	7.4	1	5	5.0
Redhead	40	231	5.8	12	74	6.2	4	22	5.5
Baldpate	19	117	6.2	5	29	5.8	1	9	9.0
Ruddy	18	96	5.3	5	23	4.6	1	2	2.0
Lesser scaup	18	154	8.6	1	14	14.0	1	4	4.0
Pintail	20	104	5.2	8	43	5.4	1	4	4.0
Teal (B-w. & Cinn.)	16	98	6.1	5	30	6.0	3	16	5.3
Teal (G-w.)	7	46	6.6	3	16	5.3	-	-	-
Am. Golden-eye	3	22	7.3	2	6	3.0	-	-	-
Wood duck	3	9	3.0	-	-	-	-	-	-
Canvasback	3	8	2.7	2	5	2.5	-	-	-
Merganser	1	4	4.0	-	-	-	1	5	5.0
Shoveler	3	11	3.7	3	13	4.3	2	10	5.0
Canada goose	77	381	5.0	33	166	5.0	19	93	4.9
Total (Except Geese)	404	2529		132	754		77	423	
Averages			6.3			5.7			5.5

Table VI. - Idaho Banding Data - Summer, 1954.

Species and Area	Male		Female		Total
	Adult	Local	Adult	Local	
Canada Geese					
Snake River, Homedale	5	104	4	134	247
Snake River, Glenns Ferry	-	3	-	1	4
Crane Creek Reservoir	7	-	5	-	12
Cascade Reservoir	2	9	-	7	18
Blackfoot Reservoir	14	74	15	80	183
North Lake Refuge	18	-	18	-	36
Camas Refuge	6	7	16	7	36
Island Park Reservoir	30	54	34	35	153
Minidoka Refuge	-	2	4	2	8
Snake River, Rupert	2	-	-	-	2
Total	84	253	96	266	699

## WATERFOWL BREEDING GROUND SURVEY - MONTANA, 1954

Wynn G. Freeman

Introduction

In 1954 the Montana Fish and Game Department conducted their sixth annual breeding ground survey.\* Essentially, it was done in the same manner as in preceding years. However, due to a lack of personnel during this period, the ground surveys for species composition and nesting success were not executed in as intensive a manner.

Climatic Conditions

Montana experienced another open winter with unseasonably warm weather during February and most of March. Warm temperatures and chinook winds greatly reduced the existing snow cover throughout the State. Much of the moisture of later snows was absorbed by relatively frost-free soils. These conditions reduced surface run-off water and produced fewer potholes in the Flathead Valley and Great Falls piedmont. The late snows in the central and eastern Highline were heavier than in the above regions and remained on the ground for an extended period. Early in May this accumulated snow was reduced to run-off in a few days and resulted in a great increase in number of potholes.

During the latter part of March and early April in the Great Falls piedmont area, temperatures dropped below zero with an abundant snow cover. This severe weather enforced a definite hardship on migrating waterfowl resulting in loss of both ducks and snow geese in this migration route. For about a week the major food source was in ranch feed lots. It was from these areas that the majority of losses were reported.

Montana, during May and June, recorded near normal precipitation and temperature. During the month of July a complete lack of rainfall accounted for the disappearance of many small potholes. In August and September above normal rainfall occurred in the east and central Highline area maintaining a better portion of the increase number of potholes throughout the breeding season.

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\* The aerial surveys were conducted by Don Brown and Ralph Cooper (pilots), and Wynn Freeman, Dale Witt and Gerald Salinas (observers), all of the Montana Fish and Game Department. Ground surveys were made by R. Trueblood, Dale Witt and D. Stockstad, of the Fish and Game Department, and Robert Brown, Richard Fevold, Bev Rose, and L. Williamson, student assistants.

### Methods

The geological subdivisions of Montana as described in "Waterfowl Breeding Conditions in Montana for 1949" (Crissey and others\*) were used as the basis for the surveys. The survey was begun as soon as it was determined that the spring migration was nearing completion.

### Results

The comparative results of the 1953 and 1954 aerial censuses are shown in Tables I and II.

The 1954 census estimates an increase of 55 percent in the waterfowl population for the total area sampled. The greatest increases are evident in the eastern and central Highline and the Sheridan moraine, adjacent to the eastern Highline. The western Highline showed a slight increase in waterfowl numbers in spite of a decrease in number of water areas. Water areas in the eastern and central Highline increased 18.9 and 72.3 percent respectively.

Leon Snyder, Refuge Manager, Bowdoin National Wildlife Refuge, has this to say about the central Highline (personal correspondence), "The migration of waterfowl into and adjacent to the Bowdoin Refuge during the spring of 1954 was considerably delayed due to the very severe weather prevailing during March and April. This was especially apparent with earlier migrants such as mallards and pintails. While temperature during May and June averaged somewhat below normal, precipitation was not too great and the nesting period as a whole was conducive to the hatching and rearing of large duck populations. The heavy snow run-off during February and April filled ponds and potholes of the east Blaine and Phillips Country areas, (central Highline) creating ideal conditions for holding of above normal numbers of the later than usual duck migrants, thus our 1954 nesting population showed a considerable increase over past years. Ideal water conditions prevailed on the refuge from the start of the nesting season throughout the summer, resulting in the best food conditions ever existing here. An estimated 51,673 ducks were produced on Bowdoin in 1954."

This year has seen the Montana Fish and Game Department's greatest single effort in goose banding. In cooperation with United States Fish and Wildlife Service personnel, 1133 geese were banded in the following areas:

Ennis Lake	243
Bowdoin Refuge	325
Nelson Reservoir	147
Ninepipe and Pablo	
Refuges	272
Flathead Lake	146
Total	1133

\* Crissey and Others, "Waterfowl Populations and Breeding Conditions - Summer 1949" Special Scientific Report: Wildlife No. 2, pp. 125-135.

An intensive goose population study in the Flathead Valley begun in 1952 is being continued by State personnel and the Montana Cooperative Wildlife Research Unit at Montana State University. The first two years of this work has been completed and the results are reported in an M. S. thesis by Mary Baraclough.

The objects of this study are to determine the population status of the geese and to develop an accurate census technique.

Table I. - Montana Waterfowl Breeding Ground Aerial Census Data, 1953-1954.

Area	Square Miles Sampled	Ducks per Square Mile	Approx. Size Sample Area	Population Estimate	Per cent Change
Eastern Highline					
1953	173.0	4.47	7,920	35,402	+53.02
1954	173.0	6.84	7,920	54,173	
Central Highline					
1953	109.2	9.68	9,468	91,650	+59.30
1954	109.2	15.42	9,468	145,997	
Western Highline					
1953	161.0	6.67	7,020	46,823	+19.79
1954	161.0	7.99	7,020	56,090	
Sheridan Moraine					
1953	25.5	35.29	1,440	50,818	+82.00
1954	25.5	64.23	1,440	92,491	
Total					
1953	468.7	14.03*	25,848	224,693	+55.21
1954	468.7	23.62*	25,848	348,751	

\* Average of four areas.

Table II. - Comparative Numbers of Water Areas as Determined from Aerial Transects, 1953-1954.

	Approximate Area Per Square Mile	Water Area Per Square Mile		Potholes		Percentage Reservoirs		Other		Total Calculated Water Areas		Percent Change
		1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	
Eastern Highline	7,920	1.69	2.01	41.3	51.9	11.6	14.4	47.1	33.7	13,385	15,919	+ 18.9
Central Highline	9,468	2.53	4.36	55.1	72.4	27.2	15.5	17.7	12.1	23,954	41,280	+ 72.3
Western Highline	7,020	2.31	1.70	55.6	43.4	25.3	29.6	19.1	27.0	16,216	11,934	- 26.4

## WATERFOWL BREEDING GROUND SURVEY - UTAH, 1954

Noland F. Nelson

Introduction

The 1954 waterfowl breeding ground survey represents the sixth consecutive year such a survey has been carried on in Utah. The survey has been expanded each year and now covers those areas which are known to contain the bulk of the waterfowl breeding population of the State. Most of Utah is either mountains or desert so that the waterfowl areas are concentrated around the major lakes, rivers, and irrigated areas. It is difficult to get accurate counts on these concentration areas but it is hoped that aerial and ground counts will give general trends in the breeding populations.

With the exception of the assistance of an aerial observer from the Utah Cooperative Wildlife Research Unit, all of the data were secured by personnel of the Pittman-Robertson Division of the State Fish and Game Department.

Survey Methods

Aerial transect routes flown in 1954 followed the identical route of permanent transects flown in 1953. The route over Cache County was eliminated because the limited waterfowl of this area did not warrant survey time. The Sevier River transect was replaced by a ground count because of the difficulty in counting this meandering stream by air. All the aerial transects were flown at elevations of 200 feet at speeds of 75 to 80 miles per hour, with two observers covering a ground strip one-eighth mile wide on either side of the airplane. Observers in most cases were able to record the species of ducks, as well as to note whether birds occurred as pairs, singles, or groups.

Intensive ground counts of waterfowl were made on key waterfowl areas in the State to augment the aerial survey. Brood counts were also made on these same State waterfowl areas.

Weather and Water Conditions

Unprecedented drought conditions in the winter, spring, and summer months of 1954 produced conditions that undoubtedly reduced the production of waterfowl in Utah. The spring run-off from winter snows was below normal in most of the State, reducing the storage of water in reservoirs and the spring flooding of many marsh areas. Heavy demands for spring and summer irrigation water, plus limited rainfall, reduced most marsh areas of the State to permanent impoundments. Many areas that have formerly produced ducks were dry in the early spring. The drought of the summer months increased the mortality of broods.



### Aerial Census

There was a reduction in the number of miles that were sampled in 1953. This was the result of eliminating the Cache County transect and reducing the size of the Sevier River sample. The Sevier River samples are not used in Table I because of the use of ground instead of aerial counts this year. The Weber County transect was increased 1.1 square miles. In most of the important waterfowl producing areas of the State, the count of breeding birds was less than the previous year. The following table gives a summary of the results of the aerial survey in 1954.

Table I. - Total Ducks Counted by Area and Square Mile as Determined From Aerial Surveys - 1953 and 1954.

Route	Square Miles Sampled		Total Ducks Counted		Ducks Per Square Mile	
	1953	1954	1953	1954	1953	1954
Box Elder County	48.0	48.0	2,946	2,752	64.5	57.3
Weber County	14.4	15.5	2,068	1,100	143.6	70.9
Davis County	14.2	14.2	386	330	27.2	23.2
Jordan River Clubs	6.2	6.2	670	809	108.0	130.5
Salt Lake County	6.7	6.7	101	36	15.0	5.4
Utah County	18.0	18.0	199	211	11.0	11.7
Total	107.5	108.6	6,370	5,238	59.2	48.2

The decrease in the number of ducks on the breeding grounds of Utah was probably due to the drought conditions that prevailed this year. A large portion of the marshy areas that are normally wet were quite dry when the census was taken.

Mallard and Redhead were the most abundant species of ducks counted on the aerial survey with Cinnamon teal being next most abundant.

### Ground Census

Ground counts on key State waterfowl refuges of lone males, lone females, and pairs indicate that there has been a decrease on these areas. Ogden Bay has had an increase in Mallard, Shoveler, Cinnamon teal, and Canada Goose. Redheads have decreased in numbers over previous years. Farmington Bay and Public Shooting Grounds have had large drops in breeding population which is due in part to construction work during the nesting season on those areas.

Ground counts on the Sevier River area indicated a population of 92.4 ducks per square mile. This was much larger than the 30.3 ducks per square mile counted by air in 1953. This increase is attributed to the more intensive coverage by the ground count.

Table II. - Estimate of Total Breeding Pairs on State Refuges from Dike Line Census - 1953 and 1954.

Species	Ogden Bay		Farmington Bay		Public Shooting Grounds	
	1953	1954	1953	1954	1953	1954
Canada Geese	114	120	62	75	21	12
Mallard	267	349	84	30	99	53
Gadwall	257	217	57	24	40	20
Pintail	215	218	63	24	31	10
Cinnamon teal	712	747	303	190	121	105
Redhead	296	261	120	80	288	156
Shoveler	121	138	69	42	33	15
Green-winged teal	2	6	-	-	-	-
Blue-winged teal	6	30	5	4	2	2
Ruddy	30	70	20	23	2	4
Total	2,021	2,156	783	492	637	376

#### Brood Counts

There was good survival and an increase in the number of goose broods at Ogden Bay and Farmington Bay, but the number of goose broods declined on the Public Shooting grounds. The decrease on the Public Shooting Grounds was due to construction activity in this area. The survival of duck broods was lower than other years. There was a large decline in the number of redhead broods on all State refuges.

### Summary

1. The breeding ground survey was again carried out in the spring of 1954. Aerial transects in Cache County and the Sevier River drainage were eliminated. Ground counts replaced the transects in the Sevier River area. Supplemental data was gathered on key State waterfowl refuges.
2. Extreme drought conditions on Utah's marshlands reduced the numbers of waterfowl nesting there and lowered the brood survival.
3. The aerial survey covered 108.6 square miles. A total of 6,282 ducks and geese were counted on these flights for a total of 48.2 birds per square mile. This was a decline of 20 percent from last year.
4. Ground counts on key waterfowl areas indicated a general decrease in the breeding population of these areas.

## WATERFOWL BREEDING GROUND SURVEY IN WYOMING - 1954

Robert M. Ballou  
and  
George F. Wrakestraw

Introduction

This year Wyoming revised its statewide duck breeding pair survey, which, although yielding more reliable results, gave little opportunity for comparison with surveys taken during 1952 and 1953.

The Canada goose inventory was conducted in the same manner as in the past and was strengthened this year by intensive area studies.

Methods

The duck breeding ground survey consisted entirely of aerial breeding pair counts during the last week of May and the first week in June. The large area of waterfowl breeding habitat within the State, the questionable value of aerial brood counts, and the limitations on time and personnel precluded making aerial brood counts or intensive ground studies this season.

Sample plots of 72 square miles (two townships) were randomly selected from all of the potential waterfowl habitat within the State accessible to a plane. Yellowstone National Park and the National Forests were excluded from sampling, as were known desert areas of little waterfowl value. Due to lack of suitable maps and shortage of time, no attempts this year have been made to stratify the samples or make ground checks on the accuracy of the aerial counts.

Six transects one mile apart were flown in each sample plot. Ducks were counted for a distance of one-eighth mile on each side of the plane. Thus, for each sample plot of two townships, complete coverage of 18 square miles was obtained. Planes of the Super Cub Cruiser and Piper J-3 class were used. In most cases the pilot assisted the single observer on counts.

In 1954 all of the Canada goose habitat within the State (excluding Yellowstone National Park) was flown. The survey was made at the height of incubation during the last week of April. Although this represents the third year many of the same areas have been surveyed, different observers and the necessity of using faster, larger aircraft makes direct comparison with past data rather difficult. Intensive ground and aerial studies on a portion of goose habitat on the Green River provided a correction factor for aerial data.

Weather and Water Conditions

Water conditions throughout central and eastern Wyoming at the commencement of the breeding season were subnormal and runoff was below average. Up to the present little improvement has been noted. In recent weeks the mountainous north-western section and portions of the stockpond area in northeastern Wyoming received

ample precipitation to maintain water levels. The remainder of the State, however, experienced drouth conditions.

### Breeding Populations

Table I presents the summary of the duck breeding ground survey. It is believed that had the survey been made two weeks earlier (mid-May), a larger number of breeding pairs in proportion to total ducks would have been recorded. Certainly the results shown, although no comparison is possible, present a more accurate index to the waterfowl breeding population than has been the case in the past. As a result of the reduced number of water areas, it is believed the total duck breeding population was somewhat below normal, but those that did bring off broods probably had sufficient water to raise their young to flight age.

Species composition and breakdown into pairs and groups are given for the duck breeding population in Table II. It is to be noted that mallards comprised nearly 43 percent of the breeding population.

Table III lists the geese observed in Wyoming from an aerial count in late April. From intensive ground and aerial studies on a portion of the Green River it was discovered that only 57 percent of the actual number of geese present on the study area were observed during the aerial inventory. A correction factor (aerial count x 1.76) has been applied in Table IV to the data presented in Table III. It should be noted that once again only geese observed as singles were considered as representing actively breeding pairs. Assuming average brood size to be 4, potential goose production for Wyoming is 1,196 birds. This figure makes no allowance for nest mortality following the inventory period.

It is of significance (Table V) that in 1953 on comparable areas 1,720 geese were actually observed from the air in early May (no correction factor applied), whereas in 1954 only 950 were actually counted (a 45 percent decrease). With the correction factor of 1.76 applied to the 1954 total, the resultant figure of 1,672 is still 3 percent below that of 1953. Production (4 times breeding singles) for the same areas in 1954 before the correction factor was used (Table III) is 27 percent below that of 1953 and 13 percent above after correction.

### Summer Banding Activities

A total of 513 Canada geese were banded during the summer of 1954 in Wyoming. From this number 191 goslings and adults were transplanted and released on restoration areas. Colored neck bands were placed on all restoration goslings and on a representative sample of geese released at trap site. A summary of the banding operations is given in Table II of the report on Live-Trapping and Banding of Waterfowl, Work Plan No. I, Job No. 4.

Table I. - Duck Breeding Ground Survey, Wyoming - 1954\*

Area	Sq. Miles in Sample	Total Sq. Mi. of Waterfowl Habitat	% of Total Habitat Sampled	Pairs per sq. Mile	Total pairs	Total Ducks per sq. Mile	Total Ducks
Eastern Wyoming	594	32,832	1.80	.816	26,790	2.68	87,989
Western Wyoming**	369	22,122	1.67	.791	17,500	2.90	64,155
Total	981	54,954***			44,290		152,144

\* Excludes Yellowstone National Park, national forests, and areas of known minor waterfowl use.

\*\* Includes Teton, Lincoln, Uinta, Sublette, Sweetwater, Park, Big Horn, Washakie, Hot Springs, Fremont Counties, and western half of Natrona County.

\*\*\* Total Square miles in Wyoming - 97,914.

Table II. - Species Composition of Duck Breeding Population, Wyoming - 1954

Species	Number				Percent of Total	
	Breeding Pairs		Groups		Western	Eastern
	Western	Eastern	Western	Eastern		
Mallard	7,330	16,103	6,175	12,063	32.5	50.5
Gadwall	1,080	943	360	628	3.9	2.8
Baldpate	600	224	420	-	2.5	.5
Pintail	550	3,153	600	1,500	2.7	8.8
Teal *	550	279	240	455	2.1	1.1
Shoveler	-	1,273	-	1,394	-	4.5
Barrow's						
Golden-eye	185	-	7,480	-	12.2	-
Redhead	-	998	-	345	-	2.6
American						
Merganser	65	-	-	-	0.2	-
Scaup	-	57	-	-	-	.1
Ruddy duck	65	57	-	-	0.2	.1
Coot	1,025	-	7,480	-	14.9	-
Unidentified**	6,050	3,703	6,400	18,024	28.8	29.0
Total	17,500	26,790	29,155	34,409	100.0	100.0

\* Includes Green-winged teal, Blue-winged teal, and Cinnamon teal.

\*\* Includes the above listed species as well as Ring-necked, Canvasback and Bufflehead.

Table III. - Canada Goose Breeding Ground Survey, Wyoming - April, 1954\*

Drainage	Non-Breeding Pairs	Breeding Singles	Groups	Total
Green	44	38	40	204
Bear	41	37	27	183
Snake	51	50	65	267
Wind	11	14	53	103
N. Platte	83	37	56	296
Powder-Tongue	-	-	12	12
Total	230	176	253	1,065

\* Excluding Yellowstone National Park.

Table IV. - Table III Adjusted by Green River Correction Factor\*

Drainage	Non-Breeding Pairs	Breeding Singles	Groups	Total
Green	77	67	71	359
Bear	72	65	48	322
Snake	90	88	114	470
Wind**	11	14	53	103
N. Platte	146	65	99	521
Powder-Tongue**	-	-	12	12
Total	396	299	397	1,787

\* Green River Correction Factor = 1.76.

\*\* Green River Correction Factor not applied.

Table V. - Comparison of Geese Observed by Aerial Count on Identical Areas,  
1953 and 1954

Drainage	1953	1954*	Change in % in 1954 from		Change in % in 1954 from
			1953	1954**	1953
Green	336	204	-39	359	+ 7
Bear	369	183	-50	322	-13
Snake	506	267	-47	470	- 7
N. Platte	509	296	-42	521	+ 1
Total	1,720	950	-45	1,672	- 3

Drainage	Breeding Singles			Potential Goslings (Average Brood 4)			Change in Percent in 1954 from 1953	
	1953	1954*	1954**	1953	1954*	1954**	*	**
Green	46	38	67	184	152	268	-17	+15
Bear	40	37	65	160	148	260	- 7	+16
Snake	50	50	88	200	200	352	0	+18
N. Platte	86	37	65	344	148	260	-57	-24
Total	222	162	285	888	648	1,140	-27	+13

\* Prior to applying 1954 Green River Correction Factor.

\*\* After Application of Green River Correction Factor.



## WATERFOWL BREEDING GROUND SURVEY - COLORADO, 1954

Jack R. Grieb\*

### Introduction

Breeding pair surveys were conducted within the period May 10 to 21. During this time, ground counts were made in the Yampa Valley, and Brown's Park, and aerial counts in the South Platte, Cache la Poudre, and San Luis Valleys, and North and South Parks. Aerial counts required 26 hours and 30 minutes flying time with a crew of three (E. Boeker, Hughes, and Grieb).

Brood counts were initiated July 5, and completed July 22 of this year. Due to lack of time, it was possible to cover only the following areas: South Platte Valley; Cache la Poudre Valley; Yampa Valley; White River Plateau; Brown's Park; and North Park. Indication as to the success of the breeding season in the San Luis Valley, and South Park must, therefore, be taken mainly from reports of local fieldmen.

The following report briefly summarizes 1954 breeding conditions in Colorado for those regions where permanent study areas have been established, and compared it, where possible, with past records from the same areas.

### Weather and Water Conditions

Climatological data indicate that Colorado is experiencing a very severe drouth this year. Information received from the Office of Irrigation Investigations reveals that, in general, snow pack in the high mountains of the State during the past winter was 50 to 60 percent of normal. The influence of this lack of stored moisture resulted in decreased water levels in reservoirs, and a very acute shortage of water for irrigation. In addition, a definite lack of local precipitation on the various breeding grounds during the winter and spring resulted in a few of the semi-permanent lakes and sloughs containing water this spring. A good many of the permanent areas were also dry for the first time in many years. All of these factors resulted in decreased waterfowl habitat in most parts of Colorado this year.

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\* Cooperating Personnel - U.S. Fish and Wildlife Service: J. Robinson, D. Droll, and Ken Baer, Game Management Agents, Colorado. Ray Buller, Assistant Regional Supervisor, Game Management and Cecil S. Williams, Central Flyway Coordinator.

Colorado Game and Fish Department - R. Kirkman, Colo. Cooperative Wildlife Research Unit, M. Sheldon, Student Assistant, H. Boeker, Wildlife Technician, E. Boeker, Pilot, N. Hughes, Pilot, and J. Grieb, Wildlife Statistician.

### Results

Ducks - A summary of the 1954 breeding pair counts is compared in Table I with counts from previous years. Comparison between 1954 and 1953 counts from five areas shows that breeding pair numbers were down 26 percent this year. However, it should be pointed out that counts from North Park and South Park were not completely comparable with similar counts in 1953 due to a change-over from ground to aerial surveys in South Park, and because only two crewmen were used on the aerial count in North Park where normally a crew of three is used. Thus, one crewman had to fly the airplane and also observe; because of the rough topography much attention had to be given to flying, and accurate counts were not possible. Eliminating these areas from the comparison results in a decrease of only 12 percent from 1953, and this is believed to be the best comparison between the two years.

Contrasting counts between 1954 and 1952 on these areas, shows a reduction of only one percent in 1954. Thus, it is believed that duck breeding pair number in 1954 were near normal, and not significantly different from what can usually be expected in this State despite the shortage of water.

Brood counts show the effect of the critical shortage of water throughout the State on production. Although some areas produced about the same number of birds as past years, total estimated State numbers are down about 19 percent from 1952, and almost 37 percent from 1953. These data do not include brood counts from the San Luis Valley which reportedly is suffering one of its worst drouths in history. This is substantiated by results of a nesting study on the Monte Vista National Wildlife Refuge conducted by Biologist Fleetwood, Fish and Wildlife Service, which indicates that only 34 percent of the attempted nests successfully hatched.

Species composition of all 1954 breeding pair counts is tabulated in Table II. This is also believed to be the best estimate of species composition for production, as brood counts were made too early in the season to sample all species in their true proportions.

Geese - Breeding pair counts of geese in the Yampa Valley and Brown's Park also show some reduction in number between 1954 and the two previous years. This amounts to a 17 percent decrease in 1954 from both these years.

Brood counts in these areas were made too late this year to adequately determine goose production; thus, no gathered data are available in 1954 for comparison with the two previous years. It is believed, however, that production conditions in 1954 most nearly approximate those of 1953; therefore, even with smaller breeding populations, production of young was probably somewhat greater than during the poor year of 1952.

### Summary

1954 breeding ground conditions in Colorado were generally characterized by a critical shortage of water throughout the State. Not only was stored moisture in the high mountains from 50 to 60 percent of normal last winter, but most lakes,

reservoirs, and sloughs had low water levels at the beginning of the breeding season, and some permanent bodies were dry for the first time in many years. This situation was never alleviated by precipitation during the late spring and summer.

In contrast, duck breeding populations were only slightly below those of 1953 (12 percent), and very similar to those of 1952 (down one percent). Geese populations were down about 17 percent this year from the two previous years.

Production records for ducks, however, reflect the drouth conditions by a decrease in the number of young of about 19 percent from 1952, and almost 37 percent from 1953. Although no collected data are available for geese, it is believed that production for this species was somewhat less than 1953, and slightly above that for 1952.

Table I. - Summary, Breeding Ground Surveys in Colorado, 1954.

Ducks												
Area	Total Square Miles of Wtfl. Habitat	No. Square Miles in Sample		Total Estimated Breeding Pairs			Total Estimated Broods			Total Estimated Young Produced		
		No. Miles	Percent	1952	1953	1954	1952	1953	1954	1952	1953	1954
San Luis Valley	1494	143.5	9.6	<u>1/</u>	<u>1/</u>	6744	-	-	2293 <sup>2/</sup>	-	-	12,611
North Park	611	55.0	9.0	-	5676	3808	-	3736	1625	-	22,864	10,075
South Platte Valley	1422	129.0	9.0	<u>3/</u>	-	2188	-	1187	705	-	7,953	3,912
Cache la Poudre Valley	343	36.0	10.5	1029	1619	1320	781	800	877	4851	4,821	4,867
Yampa Valley	220	22.0	10.0	1790	1500	1540	1360	1030	1030	8670	6,690	6,880
Brown's Park	15	15.0	100.0	291	372	217	200	56	21	1422	407	182
White River Plateau	360	18.0	5.0	580	480	-	440	380	340	2440	2,180	2,152
South Park	<u>4/</u>	-	-	-	431	195	-	-	-	<u>2/</u>	-	-
Geese												
Yampa Valley	220	22.0	10.0	120	130	110	40	90	<u>5/</u>	140	540	-
Brown's Park	15	15.0	100.0	21	12	8	18	9	<u>5/</u>	109	51	-
Goose Totals and Averages	235	37.0	16.4	141	142	118	58	99	-	249	591	-

<sup>1/</sup> Permanent sample not set up in San Luis Valley prior to 1954.

<sup>2/</sup> Total broods and young estimated from nesting study conducted on Mt. Vista Natl. Wildlife Refuge by Bio. Fleetwood, and reported in a letter by Refuge Manager C. R. Bryant.

<sup>3/</sup> No sample breeding pair counts made -- only trend counts along the South Platte River.

<sup>4/</sup> Total square miles of waterfowl habitat not known for this area.

<sup>5/</sup> Duck brood counts made too late for a good count of goose broods.

Table II. - Total Estimated Waterfowl Breeding Pair by Species, From the Important Breeding Grounds in Colorado, 1954.\*

Species	Number	Species Composition (Percent of Total)
Mallard	11,295	70.0
Blue-winged teal	886	5.5
Pintail	873	5.4
Gadwall	852	5.3
Baldpate	552	3.4
Shoveler	542	3.4
Cinnamon teal	442	2.6
Green-winged teal	220	1.4
American merganser	114	0.7
Redhead	109	0.7
Scaup	99	0.6
Ruddy duck	48	0.3
Canada goose	118	0.7
Total	16,130	100.0

\* Data derived from permanent transects in all breeding areas in Colorado listed in Table I, with the exception of the White River Plateau. Table corrected for unidentified pairs.

## WATERFOWL BREEDING GROUND SURVEY, NORTH DAKOTA

Bernard A. Fashingbauer and James E. Sjoldal

### Introduction

The waterfowl breeding ground investigations conducted by the North Dakota Game and Fish Department in 1954 represent the seventh consecutive statewide survey to be carried out.

The purpose of these waterfowl surveys is to obtain information relative to the progress of the spring migration, the size of the breeding population and the success of the breeding season. The data obtained, when compared with similar information secured in other years, will help determine the trends in the various aspects of waterfowl populations.

The census work in its entirety was carried out by personnel of the P-R Division of the State Game and Fish Department.

### Sampling Methods and Area Covered

Techniques employed in censusing the 1954 breeding waterfowl population were identical to those used in 1953. Both aerial and ground censuses were conducted.

The aerial census was conducted along 18 transects which traverse the State in an east-west direction and are located 12 miles apart in a north-south direction.

The ground census was conducted along eight transects which traverse the State in a north-south direction. The east-west distance between the ground transects varies with the location of suitable roads.

In both the aerial and ground inventories, all the game species of waterfowl observed within a one-quarter mile strip are tallied and geographically located.

Each year the breeding pair census is begun immediately after the apparent completion of the spring migration. In 1954 the aerial and ground censuses were conducted concurrently within the period May 15 to May 27, inclusive.

Aerially observed duck densities obtained by a random sample (slightly more than 2 percent) of the entire State serve as the basis in determining the breeding population index. The ground census provides information relative to the species composition and sex ratio of the waterfowl population, in addition to providing an index to water areas. The sex ratio data permit the computation of a corrective factor to compensate for hens not observed during the aerial census because of nesting activities or other reasons. By applying the detailed information obtained during the ground census to the mass aerial data, the latter becomes more useful and reliable as an indication of the state-wide minimum breeding waterfowl population.

### Weather and Water Conditions

In many respects the weather conditions which prevailed during the winter and spring of 1954 were very similar to those existing during the same period in 1953. February thaws in both years reduced the accumulated snow cover to a minimum and the spring run-off was gradual. Flooding was only very local in extent.

Due to the drought conditions which followed, there was much less surface water available during the spring migration period in 1954 than in the previous year, and it is reasonable to assume that this factor more than any other influenced the size of our breeding waterfowl population. The small temporary water areas which are considered to play such an important part during the period of waterfowl courtship and establishment of territory were almost entirely absent.

Very shortly after the breeding population became established, North Dakota received an abundance of moisture. Beginning in late May and continuing intermittently throughout June, heavy rains restored depleted water areas to their normal level, and in many instances low meadows adjacent to water areas were temporarily flooded.

The month of July was largely one of drought and by the middle of this month, water levels had dropped noticeably.

As summer waned, the receding water areas were partially replenished by frequent rains, and water did not become critical at any time during the breeding season.

### Breeding Population Trends

The 1954 breeding waterfowl inventory disclosed a 38.7 percent decrease in the size of the breeding population from that of the previous year. Extremely heavy winds which prevailed throughout the period of census may have influenced the accuracy of the counts, but it appeared certain that a significant decrease had occurred.

Data from the 1954 ground survey indicated that the aerially observed population indices must be increased by 28.2 percent to account for absent females.

Table I, II, and III will indicate the trends in North Dakota's breeding waterfowl populations.

### Success of the Season

Production success in 1954 was determined mainly on the basis of data obtained throughout the season on a single transect approximately 58 miles in length. This transect is located in the central portion of the "Coteau Region," the major breeding area in the State, and is believed representative of conditions occurring within this area generally.

The brood counts along this transect indicated that reproduction in 1954 was equal to, if not somewhat more favorable than that of 1953. Peak brood numbers were recorded during the second week of August, which is three to four weeks later than usual. Similar conditions occurred in 1953 when the peak also occurred around mid-August. Trends in production occurring along this transect are shown in Figure 1.

General observations indicated that nesting success was quite favorable despite considerable reneesting. Table IV will indicate the average brood sizes as determined by observations throughout the State.

### Summary

1. The 1954 seventh consecutive state-wide survey in North Dakota indicated a reduction in the breeding waterfowl population of 35 percent to 40 percent from that of 1953 and the previous six year average.

2. All species, with the exception of the green-winged teal and the redhead, showed a reduction in numbers. A proportionate reduction was indicated for both diving and puddle ducks.

3. Lack of temporary water areas during the period of spring migration is considered the primary reason for the reduction in breeding pairs. Following the drought of early spring, water conditions became more favorable and there was an ample supply throughout the brood season.

4. Nesting success appeared to be favorable despite considerable reneesting. Brood counts and general observations indicated that reproduction was at least equal to that of 1953 and may have been slightly greater. Average brood size for broods of all age classes ranged from 7+ to 6+.



Table I. - The 1954 Aerial Survey of Breeding Waterfowl in North Dakota  
Compared with 1953.

Transect No.	Square Mile in Sample	Total Ducks Observed		Ducks Per Square Mile	
		1953	1954	1953	1954
1	78.0	1474	1280	18.9	16.4
2	80.0	1162	1143	14.5	14.3
3	79.5	1659	1155	20.9	14.5
4	79.5	1929	1092	24.3	13.7
5	80.0	1728	580	21.6	7.3
6	80.7	2072	487	25.7	6.0
7	83.0	1905	718	22.9	8.7
8	83.0	1189	656	14.3	7.9
9	84.0	1737	912	20.7	10.9
10	85.0	1703	860	20.0	10.1
11	85.0	1432	831	16.8	9.8
12	85.0	972	707	11.4	8.3
13	86.0	1157	811	13.5	9.4
14	86.0	790	809	9.2	9.4
15	87.7	1416	633	16.4	7.2
16	89.0	1136	396	12.8	4.4
17	90.0	1111	826	12.3	9.2
18	89.0	963	1010	10.8	11.3
<hr/>					
Total	1510.4	25,535	14,906		
<hr/>					
Average				17.1	12.6

Table II. - The 1954 Ground Survey of Breeding Waterfowl in North Dakota Compared with 1953.

Transect No.	Sq. Mile in Sample	Water Areas				Waterfowl					
		Number		Surface Areas		Ducks Per Sq. Mi.		Breeding Prs. Per Sq. Mi.		Coots Observed	
		1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
I	59	130	162	181	313	9.8	11.8	5.5	6.2	20	153
II	60	185	226	232	242	7.7	6.6	4.7	3.4	12	68
III	58	361	324	376	287	11.9	12.2	7.4	5.7	112	165
IV	58	588	229	938	434	19.3	21.8	11.5	13.0	165	85
V	61	364	212	1302	345	20.9	13.1	12.1	7.5	93	27
VI	52	483	143	261	127	8.8	5.4	5.3	3.3	5	7
VII	50	392	133	168	103	6.6	4.0	4.2	2.8	97	6
VIII	55	254	109	158	154	2.6	0.8	1.4	0.4	29	7
Total	453	2757	1538	3616	2005					533	518
Average						10.9	9.7	6.5	5.4		

\* The number of breeding pairs is based upon the assumption that each male observed represents a breeding pair.

Table III. - Summary of Waterfowl Breeding Ground Trends in North Dakota - 1948 - 1954.

Indices to Total Breeding Ducks					
Species	Ave. Index Incl. 1948 - 1953	1953 Index	1954 Index	Percent of Change of 1954 Index From	
				Average	1953
Mallard	195,496	202,739	152,542	-22.0	-24.7
Pintail	392,588	268,564	186,788	-52.4	-30.5
B-w. teal	473,874	555,851	275,666	-41.9	-50.4
G-w. teal	5,276*	3,218	7,064	+33.9	+119.5
Gadwall	88,753	120,093	73,946	-16.7	-38.4
Baldpate	28,101	31,888	27,182	- 3.3	-14.8
Shoveler	152,365	114,973	73,410	-51.8	-36.2
Total Puddlers	1,336,453	1,297,326	796,598	-40.2	-38.6
Redhead	40,497	40,372	42,919	+ 6.0	+ 6.3
Canvasback	30,877	31,303	15,737	-49.0	-49.7
Scaup	40,887	77,234	25,126	-38.5	-67.5
Ring-necked	T	T	-	-	-
Bufflehead	T	T	-	-	-
Ruddy	21,355	13,604	12,697	-40.5	- 6.7
Total Divers	133,616	162,513	96,479	-26.9	-39.9
Total Ducks	1,470,069	1,459,839	893,077	-38.9	-38.7
Coot	945	533	518	-45.1	- 2.8

Index to Water Conditions: Equals number of water areas per square mile times the square miles in the area sampled.

Ave. Index 1950 - 1953	1953 Index	1954 Index	% Change 1954 Index From	
			Average	1953
509,293	429,643	239,874	-52.9	-44.2

\* Average for 1952 and 1953 only.

Table IV. - Brood Size as Determined by State-wide Observations Throughout the Season.

Species	Class I		Class II		Class III	
	No. of Broods	Average Size	No. of Broods	Average Size	No. of Broods	Average Size
Blue-winged teal	74	8.1	44	7.3	44	7.7
Mallard	52	6.7	37	6.9	25	6.4
Pintail	39	6.2	32	6.0	52	6.5
Gadwall	20	7.5	24	7.6	8	6.9
Shoveler	14	7.1	8	6.6	11	6.6
Baldpate	5	10.1	2	9.0	-	-
Redhead	5	6.2	3	4.7	5	7.4
Ruddy	11	6.5	4	7.0	3	5.0
Canvasback	14	8.1	15	6.4	8	5.4
Unidentified	8	7.6	9	5.2	2	4.0
Total	242	7.29	178	6.77	158	6.75

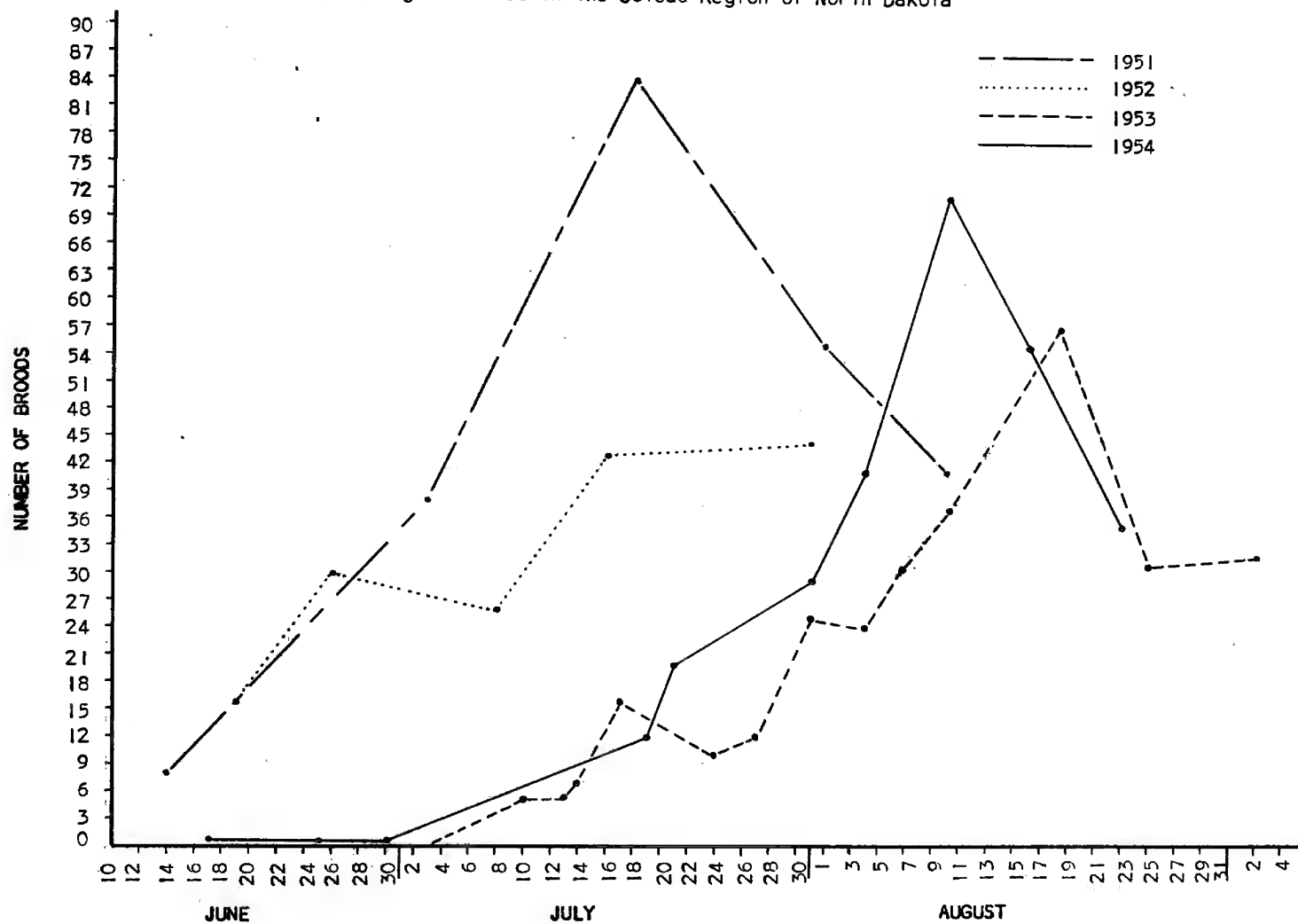
#### Banding Operations

Late appearance of duck broods prevented successful banding operations to be carried out before the last week of July. The work was continued throughout the month of August.

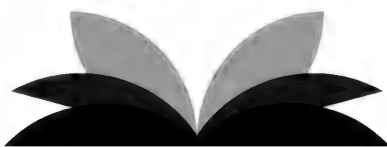
The banding work was conducted by a single crew of four to eight men consisting of North Dakota Game and Fish Department employees and United States Game Management Agents. The drive-trap method was used exclusively and emphasis was placed upon the capture of locally reared birds. Approximate 80 percent of the 1652 birds banded were in this category.

The species composition, age and sex of 1627 of the ducks banded are shown in Table V.

Figure 1. Trends in Waterfowl Production along a Transect 58 miles in length located in the Coteau Region of North Dakota



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This season's efforts resulted in the banding of the largest number of ducks to be banded by this Department in any one year. The relatively high success was due mainly to the increased endeavor stimulated by the extensive United States - Canada cooperative banding program initiated this year, and to the larger number of personnel comprising the banding crew.

Table V (Part 1) - Species Composition of the Waterfowl Banded During 1954 Season.

Species	Number	Percent
Blue-winged teal	1216	73.60
Gadwall	163	9.90
Pintail	82	4.96
Shoveler	53	3.21
Baldpate	45	2.70
Mallard	36	2.18
Coot	23	1.39
Redhead	20	1.21
Green-winged teal	6	.40
Canvasback	5	.30
Ruddy duck	2	.12
Red breasted merganser	1	.06
Total	1652	

Table V (Part 2) - Age and Sex of the Waterfowl Banded During 1954 Season.

Age	Male		Sex Female		Total	
	Number	Percent	Number	Percent	Number	Percent
Local	653	40.1	635	39.0	1288	79.1
Adult	208	12.8	131	8.1	339	20.9
Total	861	52.9	766	47.1	1627	100.0

## WATERFOWL BREEDING GROUND SURVEY, SOUTH DAKOTA, 1954

Ray Murdy and Maurice E. Anderson

### Introduction

This report constitutes a preliminary, partial summary of the findings of the 1954 waterfowl breeding ground surveys in South Dakota. These investigations consist of a survey of the breeding population and a brood survey.

## BREEDING POPULATION SURVEY

### Methods of Survey

The waterfowl breeding population survey consists of two phases, a gridded, state-wide, aerial survey and a ground survey in the better-than-average habitat in most of the counties. The aerial survey provides estimates of state-wide duck and water area densities and distributions. The ground survey contributes: (1) A correction factor, based on observed sex ratios, which is used to correct the aerially observed duck densities to compensate for unobserved females on nests; (2) Species composition data which are also used to estimate species densities; and (3) An estimate of the relative coot density.

The aerial and ground surveys were made concurrently during the week of May 10 - 15. Descriptions of the methods of the surveys appear below.

### Aerial Survey

The system of transects for the aerial survey consists of 16, east-west, one-quarter mile wide transects spaced 12 miles apart, north to south. This year all of these transects were flown east of the Missouri River. West of the river coverage was reduced to every other transect, resulting in a west-river coverage of eight, east-west transects spaced 24 miles apart, north to south. State-wide coverage totaled 4260 linear miles or 1065 square miles. The transects were flown by three pilot-observer teams in light (65-90 h.p.) planes.

### Ground Survey

The ground survey consisted of 45 standard ground transects run in 50 counties throughout the State by 34 State game wardens. These transects totaled 2078 linear miles or 517 square miles of coverage.



### Waterfowl Densities

A total of 11,830 ducks were observed on the 1065 square miles of aerial transects. In the past these data have been used directly to calculate the observed state-wide duck density. This year, because only every other transect was flown west of the Missouri River, the observed duck density was based on data which were inflated to include twice the number of ducks observed west of the river and twice the actual west river square-mile coverage. This correction was necessary in order to obtain a valid estimate of the observed state-wide duck density which is directly comparable to that of previous years. A total of 1102 ducks were actually observed on the 390 square miles of transects west of the Missouri River. Therefore, the raw data were increased by these amounts, resulting in totals of 12,932 ducks and 1455 square miles of aerial coverage. Thus the 1954 state-wide observed duck density was calculated to be 8.89 ducks per square mile.

The correction factor for hens on nests was 1.22, based on 7564 males and 5677 females observed on the ground transects. Correction of the observed density of 8.89 ducks per square mile by the correction factor of 1.22 results in a minimum state-wide duck density of 10.85 ducks per square mile. This is a minimum density because a considerable, but undetermined, portion of the birds on aerial transects are not observed. From the density of 10.85 ducks per square mile and the 74,778 square miles in the State, excluding the Black Hills, the 1954 minimum breeding population in South Dakota is estimated to be 811,000 ducks or 405,500 breeding pairs.

### Waterfowl Density Trends

The 1954 minimum duck density of 10.85 ducks per square mile or 811,000 birds is 21 percent lower than the 1953 minimum density of 13.65 ducks per square mile of 1,021,000 ducks. This decrease has reduced the breeding duck population to a level that is comparable to the average breeding population over the last four years. The current breeding duck density is a non-significant four percent greater than the 1950-53, four year average of 10.40 ducks per square mile or 778,000 birds.

The number of coots observed on the ground transects provides a rough index to the breeding coot population. A total of 1779 coots were observed on 517 square miles of transect this year, compared with 3295 on 558 square miles of transect in 1953. Thus, the index to the current population of breeding coots is 3.4 birds per square mile or 42 percent below the 1953 average of 5.9 coots per square mile.

### Waterfowl Distribution - Geographic

The geographic distribution of the 1954 breeding duck population is pictured in Figure 1.

### Waterfowl Distribution - Physiographic

The physiographic distribution of the breeding duck population is indicated in Table 1. The main difference between the 1954 distribution and that of 1953 is the usual decrease in importance of the western part of the State that occurs during drier years. The Minnesota Valley was the only area that showed an increase in the actual duck density (17 percent). The other physiographic divisions showed decreases in duck densities that were more extreme in the west (Missouri Hills, 38 percent and Missouri Plateau, 35 percent) than in the east (Prairie Hills, 15 percent and James River Valley, 7 percent). As a result the 1954 distribution was such that 47 percent of the state-wide population was in the James River Valley, 22 percent in the Prairie Hills, 16 percent on the Missouri Plateau, 13 percent in the Missouri Hills, and 2 percent in the Minnesota Valley.

### Species Densities and Species Composition

Data pertaining to the estimates of species densities and percent composition appear in Table II. Species composition is expressed as percentages of the total population and is based on the number of males of each species that are observed on the ground transects. Species densities are expressed as birds per square mile and are estimated as the product of the percent composition and the minimum, state-wide duck density.

The only species that increased in density over 1953 was the gadwall which increased 21 percent. The scaup density was up over 60 percent over 1953, but this species is usually in migration to a varying degree each year when this survey is made. So the recorded increase in scaup undoubtedly reflects more migrant birds and not an increase in the actual breeding population.

All other species showed decreases in abundance which ranged from 17 percent to 40 percent. The most drastic decrease in abundance occurred in the canvasback population which was 40 percent less numerous than in 1953. The next largest decreases occurred in the pintail (28 percent) and ruddy duck (26 percent). Similar but lesser decreases occurred in the abundance of mallards (19 percent), blue-winged teal (17 percent) and baldpate (17 percent). The shoveler and redhead apparently decreased the least, 14 percent for the shoveler and 15 percent for the redhead.

Table I. - Physiographic Distribution of the Breeding Waterfowl Population and 1953 - 1954 Trends.

Physiographic Division	Uncorrected Ducks/Sq. Mi.		Corrected*Ducks Per Square Mile			Est. Minimum Population		Percent of State-wide Population		
	1953	1954	1953	1954	Change	1953	1954	1953	1954	Change
Minnesota Valley	9.45	10.14	10.58	12.37	+ 17%	13,000	15,000	1%	2%	+ 1%
Prairie Hills	23.41	18.31	26.22	22.34	- 15%	212,000	181,000	21%	22%	+ 1%
James River Valley	19.81	16.87	22.19	20.58	- 7%	416,000	387,000	41%	47%	+ 6%
Missouri Hills	20.45	11.71	22.90	14.29	- 38%	173,000	108,000	17%	13%	- 4%
Missouri Plateau	4.73	2.83**	5.30	3.45	- 35%	207,000	135,000	20%	16%	- 4%
State-wide	12.19	8.89	13.65	10.85	- 21%	1,021,000	826,000	100%	100%	0

\* Corrected from ground transect data to compensate for unobserved females on nests.  
Corrected by 1.12 in 1953 and 1.22 in 1954.

\*\* Based in 1954 on twice the number of ducks observed and twice the number of square miles of the reduced Missouri Plateau coverage.

Table II. - Species Composition, Species Densities, and 1953-1954 Trends in the South Dakota Waterfowl Breeding Population.

Species	Number of Males		Percent Composition			Species Densities*		
	1953	1954	1953	1954	Change	1953	1954	Change
Blue-winged teal	4093	3165	48.71	41.84	- 6.87	6.64	4.55	- 17%
Pintail	1279	1049	15.23	13.86	- 1.37	2.07	1.50	- 28%
Mallard	1084	1000	12.90	13.22	+ 0.32	1.76	1.43	- 19%
Shoveler	798	781	9.50	10.32	+ 0.82	1.30	1.12	- 14%
Gadwall	258	353	3.07	4.66	+ 1.59	0.42	0.51	+ 21%
Redhead	254	244	3.02	3.22	+ 0.20	0.41	0.35	- 15%
Ruddy	116	98	1.38	1.29	- 0.09	0.19	0.14	- 26%
Scaup	447	815	5.32	10.77	+ 5.45	0.73	1.17	+ 60%
Canvasback	33	23	0.39	0.30	- 0.09	0.05	0.03	- 40%
Baldpate	40	33	0.48	0.43	- 0.05	0.06	0.05	- 17%
Green-winged teal	7	3	0.08	0.04	- 0.04	0.01	T	-
Wood duck	8	0	0.10	0	- 0.10	0.01	-	-
Black duck	1	0	0.01	0	- 0.01	T	-	-
Bufflehead	1	0	0.01	0	- 0.01	T	-	-
Total	8419	7564	100.00	100.00		13.65	10.85	

\* Product of percent species composition and minimum state-wide duck density.

### Percent Composition

The percentage that each species contributes to the 1954 population is blue-winged teal, 42 percent; pintail, 14 percent; mallard, 13 percent; scaup, 11 percent (probably 90 percent migrants); shoveler, 10 percent; gadwall, 5 percent; redhead, 3 percent; ruddy, 1 percent; canvasback, baldpate, and green-winged teal, each less than 1 percent.

### Water Area Densities

The aerial survey revealed a decrease of 36 percent in the 1954 state-wide abundance of water areas compared with the water area density of 1953 (Table III). The average state-wide density of water areas of all types was 4.64 areas per square mile in 1954 and 7.23 per square mile in 1953. The 1954 water area density is 22 percent below the 1950-1953, four-year average of 5.93 water areas per square mile.

Table III. - Physiographic Distribution of Total Water Areas, and 1953-1954 Trends.

Physio- graphic Division	Total Water Areas Per Square Mile		Change
	1953	1954	
Minnesota Valley	11.32	8.81	- 22%
Prairie Hills	11.81	10.61	- 10%
James River Valley	13.03	6.56	- 50%
Missouri Hills	7.19	3.13	- 56%
Missouri Plateau	3.68	2.49	- 32%
State-wide*	7.23	4.64	- 36%

\* In 1954 based on twice the number of water areas and square miles sampled on the Missouri Plateau to compensate for the reduced coverage of the Missouri Plateau.

The changes in water area abundance in the various physiographic divisions of the State are shown in Table III. The reduction in water area density was general over the entire State, but was greatest in the central part, less severe in the west, and least severe in the east. The reduction in water area density was the most pronounced in the Missouri Hills which contained 56 percent fewer water areas than in 1953 and in the James River Valley which had a 50 percent reduction in water areas. On the Missouri Plateau water areas were 32 percent less numerous than last year. In the east the Prairie Hills and Minnesota Valley had only 22 percent and 10 percent fewer water areas, respectively.

### Brood Production Survey

This is the second year of extensive brood survey in South Dakota. At present this survey is limited to the portion of the State east of the Missouri River. The survey consists of two phases which, when considered together, provide an index to duck brood production. One phase is an extensive aerial survey, which provides an index to brood density in mid-July. The second phase is a system of ground transects which is run weekly throughout the brood season to obtain an estimate of the hatching curve. Calculation of the brood production index is made at the close of the brood season. This index consists of the July brood density index increased by the percent of the broods that the hatching curve indicates was flying at the time of the July survey and the percent that was hatched after the July survey.

Since the hatching curve cannot be constructed until the end of the brood season, only the extensive survey of mid-July brood density is of any value in predicting production. Therefore, this report deals only with the mid-July brood density survey which serves to compare current brood production through mid-July with production during the same period in 1953.

### Methods of Survey

The July brood density survey is based on the same system of gridded, aerial transects that is used for the aerial phase of the breeding population survey in May. The east-river portions of every other transect are flown. Coverage is made by two pilot-observer teams. The survey was made during the week of July 11-17 in 1954 and the week of July 13 - 19 in 1953. Data obtained concerning the density of duck broods and water areas appear in Table IV.

### Brood Densities and Trends

The mid-July, east-river brood survey indicated a minimum brood density of 0.65 broods per square mile. This is 8 percent below the 1953 mid-July density of 0.71 broods per square mile.

The extreme eastern part of the State, the Minnesota Valley and Prairie Hills, had a considerably higher brood density than in 1953. In the Minnesota Valley 0.33 broods were observed per square mile where none were observed in 1953. In the Prairie Hills the observed brood density was 39 percent greater than in 1953.

The western portion of the east-river country contained considerably fewer broods than in 1953. The Missouri Hills showed the greatest decrease with a brood density 60 percent lower than that in 1953. The brood density in the James River Valley was 36 percent below the density in 1953.

Table IV. - Indices to Duck Brood and Water Area Densities in Mid-July, 1954 and 1953-1954 Trends.

Physiographic Division	Duck Broods			Water Areas*		
	Broods Per Square Mile			Water Areas Per Sq. Mi.*		
	1953	1954	Change	1953	1954	Change
Minnesota Valley	0.00	0.33	+	3.33	1.78	- 47%
Prairie Hills	1.04	1.45	+ 39%	4.59	3.05	- 34%
James River Valley	0.72	0.46	- 36%	3.81	2.07	- 46%
Missouri Hills	0.48	0.19	- 60%	2.57	1.71	- 33%
East-River Total	0.71	0.65	- 8%	3.72	2.23	- 40%

\* Total water areas excluding streams.

#### Water Area Densities and Trends

The numbers of water areas observed during the mid-July brood survey provide estimates of the densities of water areas existing at that time of the season. The 1953 and 1954 densities are shown in Table IV and refer to densities of all types of water areas excluding streams. During the current survey an average density of 2.23 water areas per square mile was observed. This is 40 percent below the 1953 density of 3.72 per square mile.

The decrease in mid-July water area density was general throughout the east-river coverage. The decreases in mid-July water area densities were 47 percent in the Minnesota Valley, 46 percent in the James River Valley, 34 percent in the Prairie Hills, and 33 percent in the Missouri Hills.

#### Summary

The density of water areas at the start of the waterfowl breeding season in South Dakota has built up over the past three years to a peak of 7.23 water areas per square mile in 1953. During the past winter snowfall was light, especially in the western part of the State. Rainfall during the early spring failed to bring water levels to their previous point, and as a result there were only 4.64 water areas per square mile at the start of the breeding season. This represents a decrease of 36 percent below the 1953 density and is 22 percent below the 1950-1953, four-year average of 5.93 water areas per square mile.

This reduction in water areas was general over the State but was most severe in Missouri Hills (56 percent) and James River Valley (50 percent). The Missouri Plateau suffered moderately (32 percent) and the Minnesota Valley and Prairie Hills were affected the least (10 percent and 22 percent respectively).

The decreases in water levels was accompanied by a 21 percent decrease in the breeding waterfowl population. The minimum state-wide duck density was estimated to be 10.85 ducks per square mile, compared with 13.72 per square mile in 1953. The current duck density is about the same (4 percent greater) as the 1950-1953, four-year average density of 10.40 birds per square mile and represents a minimum population of 811,000 ducks. Coots decreased in abundance about 40 percent below their 1953 level.

The gadwall was the only species that showed an increase in density (21 percent). The most drastic decrease occurred in the canvasback population which was 40 percent lower than in 1953. Substantial decreases occurred in the abundance of pintails (28 percent) and ruddy ducks (26 percent). Lesser, and similar, reductions occurred in the densities of mallards (19 percent), blue-winged teal (17 percent), baldpate (17 percent), redhead (15 percent), and shoveler (14 percent).

The above changes in species densities resulted in a breeding duck population consisting of 42 percent blue-winged teal, 14 percent pintails, 13 percent mallards, 11 percent scaup (probably 90 percent migrants), 10 percent shovelers, 5 percent gadwalls, 3 percent redheads, 1 percent ruddy ducks, and less than 1 percent each of canvasbacks, baldpates, and green-winged teal.

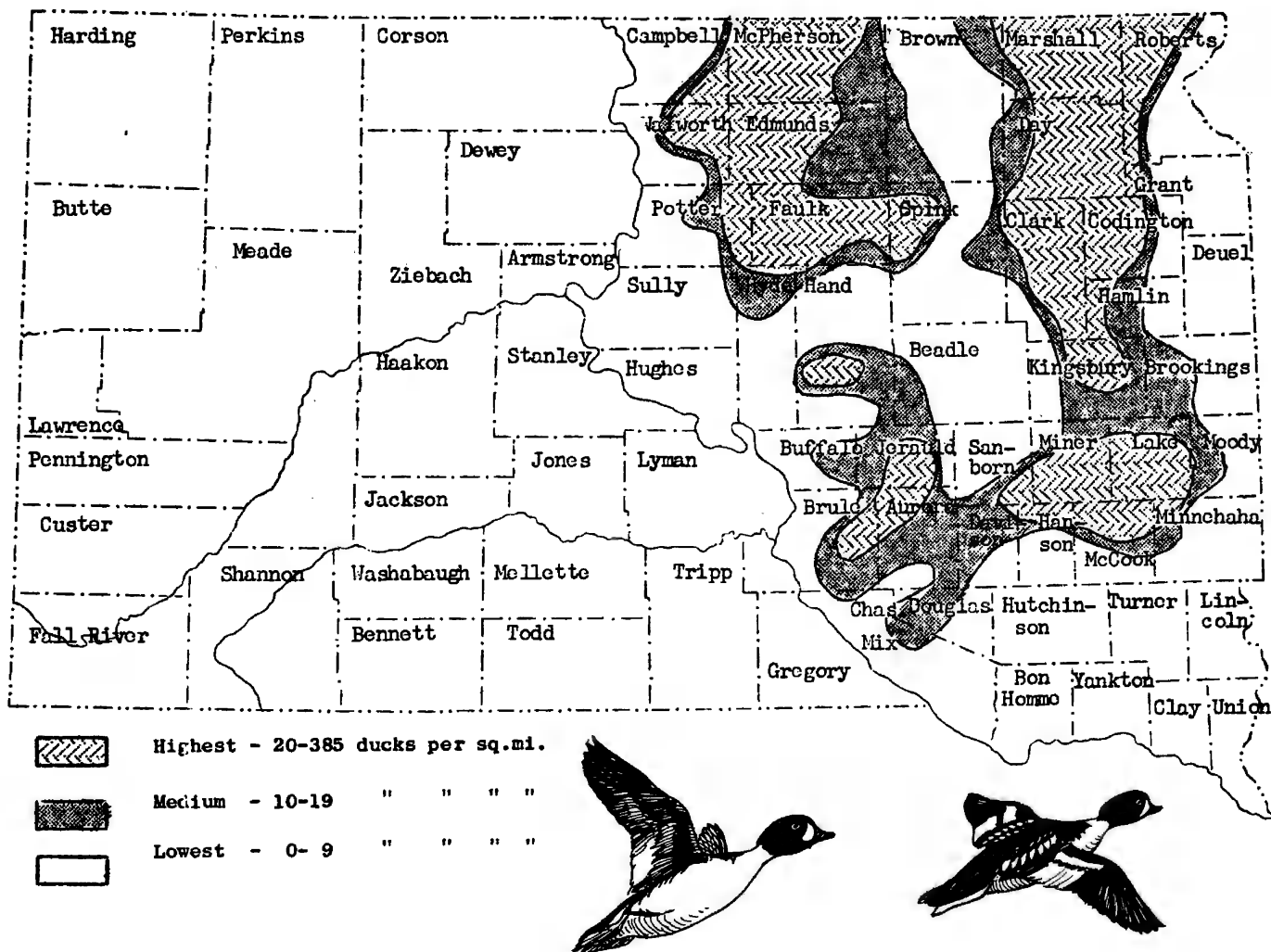
Rainfall between the time of the breeding population survey in mid-May and the brood survey in mid-July was not sufficient to check the rapidly dropping water levels. At the time of the mid-July brood survey there were 40 percent fewer water areas (other than streams) east of the Missouri River than there was at the same time in 1953. This reduction in mid-July water area density was general over the eastern part of the State, averaging 47 percent in the Minnesota Valley, 34 percent in the Prairie Hills, 46 percent in the James River Valley, and 33 percent in the Missouri Hills.

Despite the reductions in breeding populations and water levels, the east-river brood survey in mid-July indicated a duck brood density comparable to that of mid-July in 1953. An average of 0.65 brood per square mile was observed in the east-river country which is 8 percent below the 0.71 brood per square mile density in 1953. The distribution of broods, however, was considerably different than in 1953. The extreme eastern part of the State had a considerably higher brood density, especially in the north. In the Prairie Hills the density was 39 percent above that of 1953. The western portion of the east-river country contained substantially fewer broods than 1953, averaging 60 percent less in the Missouri Hills and 36 percent less in the James River Valley.

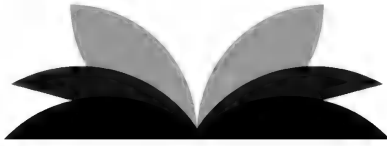
In short, the 1954 breeding population in South Dakota is 21 percent below that of 1953 but is approximately average for the four-year period 1950-1953. Water conditions are poorer than they have been at any time during the 1950-1953 period. But brood density through mid-July is comparable to that during the same period in 1953.



Figure 1. Geographic Distribution of the 1954 Breeding Duck Population in South Dakota



BHL



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## WATERFOWL BREEDING GROUND SURVEY, NEBRASKA, 1954

Harvey W. Miller

### Introduction

A waterfowl breeding ground survey has been conducted in Nebraska for the seventh consecutive year. The purpose of the survey is to provide indicators to the waterfowl population by measuring the seasonal and yearly trends in breeding numbers and production success. All data presented were gathered by the writer except where noted.

### Method of Sampling and Area Covered

The main waterfowl breeding grounds of Nebraska are found in the sandhills region; therefore, counties located within this region were again used as the study area.

Aerial transects were established for the first time over this area. Data were gathered on a systematic sample system using the one-fourth mile transects with two observers. Only observed ducks were recorded flying at 100-150 feet of altitude using a Cessna 170 airplane which cruised at a calculated ground speed of 95-105 miles per hour.

Ground transects were again covered using the same routes and methods as were used in previous years. Data from these counts were used to determine trends from previous years and also as a basis of determining species indices from the aerial counts.

### Weather and Water Conditions

Unseasonably warm weather prevailed in March and April causing two weeks or more advancement in the first breeding activity. Then, a severe freeze and blizzard occurred in the sandhills the first week of May. This was followed by relatively normal spring weather until mid-June when very hot weather accompanied by high winds set in. Late August and early September had intermittent cold rainy periods along with more normal summer weather and temperatures.

No trend data is available for the sandhills water. Observations, however, indicate that water levels in the western sandhills were generally good throughout the season. Those in the eastern area however, were good only in the ground-water controlled lakes. Potholes and other temporary type water areas showed little recovery from the 1953 dry-up with the result that most of the breeding waterfowl was restricted to the larger permanent type lakes. Many of these lakes showed near record levels for at least the early part of the breeding season.

Late fall rains over the sandhills helped to maintain the water levels and to prevent any significant dry-up from occurring.

Breeding Population Trends

Table I. - Breeding Population Ground Counts .

	Computed Pairs*	Pairs Per Square Mile	Total Ducks	Ducks Per Square Mile
<u>Mid-May</u>				
Western (A & B only)				
1954	318	12.5	639	25.2
1953		18.9		34.2
Change to 1954		-34%		-26%
<u>Mid-June</u>				
Western				
1954	332	10.6	594	18.9
1953		12.1		18.5
Change to 1954		-12%		+ 2%
1948-1953 Average		16.7		30.6
Change to 1954		-37%		-38%
Eastern				
1954	23	4.9	33	7.0
1953		10.3		12.9
Change to 1954		-52%		-46%

\* Assuming lone males to be territorial and to represent a pair.

It is apparent that the waterfowl breeding population trend is down for 1954 as compared to 1953 and the average of the prior six years. The major portion of this loss occurred in the eastern area with the western loss being relatively insignificant. The losses for both areas appeared to have been in direct relation to the loss of available habitat.

Table II. - Breeding Population Aerial Counts.

	<u>Eastern Sandhills*</u>	<u>Western Sandhills**</u>
Total study area (square miles)	5,001	12,384
Square miles in sample	154.8	297.2
Total observed ducks	2,091	1,846
Ducks per square mile	13.5	6.2
Duck index (ducks per square mile x study area)	67,564	76,905

\* Includes Wheeler, Garfield, Holt and Rock Counties and Brown County east of State Highway 7. Counts made May 11-12, 1954. Conservation Officer Von Dane, Pilot and U.S. Game Agent W. G. McClure and Writer, Observers.

\*\* Includes Grant, Arthur, Garden, Sheridan, and Cherry Counties and Brown County west of State Highway 7. Counts made June 8-12, 1954. Conservation Officer Von Dane, Pilot and Biologist G. Schildman and Writer, Observers.

Although no comparable data are available to indicate trends, these aerial counts are presented as the only available indices to the size of the sandhill breeding population.

The June counts in the western area were found necessary when data gathered on a mid-May random sample of lakes proved useless for the establishment of trends or indices. A comparison of ground counts made over the same routes in that area indicated a loss of 31 percent in total observed ducks from mid-May to mid-June. Using this as a correction for the aerial counts would indicate a mid-May breeding population in the western sandhills of about 111,000 ducks.

A statistical analysis of the aerial count data by Dr. Don Kanel, Department of Agricultural Economics, University of Nebraska showed the coefficient of variation to be plus or minus 28 percent of the estimated total for the eastern area and plus or minus 36 percent of the estimated total for the western area. While these are in excess of the 20 percent limits of error desired throughout the flyways, it must be noted that no correction factors such as those for unobserved ducks, have been applied. Therefore, these indices probably represent the minimum breeding population for the sandhills.

Table III. - Sandhill Waterfowl Species Indices.

Species	Eastern Sandhills		Western Sandhills	
	Percent Ducks*	Species Index**	Percent Ducks*	Species Index**
Mallard	13.0	13,789	23.4	28,738
Gadwall	1.8	1,216	6.1	6,647
Pintail	8.3	8,718	3.2	3,627
Green-winged teal			0.5	510
Blue-winged teal	52.8	38,812	23.9	26,154
Shoveler	10.3	7,592	5.9	6,478
Redhead			19.4	8,256
Canvasback			1.4	1,076
Scaup	13.9	3,758		
Ruddy duck			16.3	5,550
Total		73,894		87,036

\* Percent of total ducks observed on ground counts.

\*\* Using ground count species composition and aerial count estimated totals. Corrected for non-breeders and females on nest.

#### Success of the Season

Evidence of some nest destruction in the early nesting mallards and pintails has been apparent in the sandhills. Newly hatched broods of these species observed rather late in the season would seem to indicate that at least some of this loss was made up by re-nesting. The uniform age of the broods observed on the mid-July brood counts indicated a somewhat late hatch with a high peak for all species. Possibly the May storm caused this general delay.

Table IV. - Sandhill Brood Counts, Mid-July.

	Western Routes	Eastern Routes	Overall Routes
Broods observed	43	5	48
Total ducklings	292	35	327
Ducklings per brood			6.8
Broods per square mile			
1954	1.5	0.9	1.4
1953	1.4	2.2	1.6
Change 1953 to 1954	+ 7%	-59%	-13%
Average 1948 to 1953	2.2	3.2	2.4
Change average to 1954	-32%	-72%	-33%
Broods per pair			
1954	.13	.22	.14
1953			.07
Change 1953 to 1954			+100%
Average 1948 to 1953			.12
Change average to 1954			+ 17%

The trends indicated in Table IV may have been influenced by the uniform brood appearance at the time of the counts. Later observations indicated an unusually good hatching and rearing season though broods continued small.

#### Summary

The sandhills breeding population of 1954 was down significantly from that of 1953 and from the average of the six prior years. This loss occurred mainly in the eastern area and appears to be directly related to the loss of available habitat due to drought. Production appears to have been near normal as to brood size and above normal in broods per pair.

It is believed that the indicated increase in production success may have very nearly offset the loss in breeding population resulting in only a minor decrease in overall production.

Banding Results

Table V. - Banding Results with Sex Ratios, August, 1954.

Species	Local Male	Adult Male	Local Female	Adult Female	Total Bands	Local Male: 100 Lone Females
Mallard	32	1	34	3	70	96:100
Gadwall	9	1	6	1	17	
Pintail	34		26	3	63	131:100
Green-winged teal	2		5	1	8	
Blue-winged teal	478	46	393	54	971	122:100
Shoveler	8	3	4	1	16	
Redhead	18		20		38	90:100
Canvasback	2				2	
Scaup				1	1	
Coot					1	



## WATERFOWL BREEDING GROUND SURVEY, MINNESOTA, 1954

Forrest B. Lee\*

Spring Migration, Weath and Water Conditions

During the latter part of February which was unseasonably mild, some large flocks of mallards arrived in southeastern Minnesota. March started out mild, however, on March 12 and 13 a glaze, sleet, snow and wind storm hit southwestern Minnesota and 11.0 inches of snow fell at Marshall. This snow melted very rapidly and by March 22 all of the streams in the Marshall area were flowing and in many places were flooding low areas.

It was then that one of the most spectacular spring migrations of many years occurred in southwestern Minnesota. Mallards and pintails were moving in, in great numbers on March 22. An estimated 10,000 to 20,000 ducks were on a seven-mile stretch of the Redwood River. On March 25 a check was made of the Redwood River just east of Green Valley by the Area X Biologist and an estimated 40,000 to 50,000 pintails and mallards were seen in one flooded area about a half-section in size. The build-up of pintails and mallards was still continuing on March 26. Peak numbers appeared to be present on March 31 and estimates of numbers in the area varied from several hundred thousand to possibly two million. Nearly all of the large flocks had left by April 6.

The usual migration of ducks into the State occurred in mid-April when many water areas in southern and central Minnesota opened up. A heavy rainstorm on April 26 pounded a narrow band of country from Glenwood to Morris with four to seven inches of rain.

One of the most unseasonable weather conditions of many years occurred over much of the State from April 30 to May 10. During parts of this period there was considerable snowfall and blizzard conditions prevailed in varying degrees. The northwestern part of the State was hardest hit. In the Ely area this was the heaviest May snowfall in 40 years. Fifteen to 25 inches of snow fell in Koochiching County. Eleven inches were recorded in Beltrami County and heavy snowfall occurred in the northern part of Area VII.

Snow fell in lesser amounts in a broad circular belt of the State that could be considered as a periphery of the northeast part that was hardest hit. From two to six inches of snow fell in Roseau County and parts of Areas V, IV, VI, VIII, and IX. Areas X, XI, and XII had moderate weather during the time the stormy weather prevailed to the north.

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\* Migration, breeding population, and brood data summarized in this report were gathered by area game biologists of the Minnesota Division of Game and Fish: Area I, Milton H. Stenlund; Area II, Vernon E. Gunvalson; Area III, Lester T. Magnus, Roseau; Area IV, Robt. E. Farnes, Thief River Falls; Area V, Norman J. Ordal, Fergus Falls; Area VI, John L. Zorichak, Brainerd; Area VII, Walter H. Petraborg, Aitkin; (Cont.)

The effects of this stormy period on waterfowl might be several. Ordinarily, judging from our brood age data, some early nesting takes place in April and some ducks start incubating around the first of May. These are mostly mallards, and in the prairie areas, pintails, also. It is doubtful if any nesting had started in the northeast part of the State. However, in the periphery area of the storm the spring had started out early and some nesting likely had begun. These nests were especially vulnerable to the below-freezing weather and snow since incubation in most cases would not have started and the eggs were exposed to the elements.

Another effect of this weather was on the spring migration. Some observers believed that migrants moved out of the areas hardest hit, and others noted that the northward movement of ducks slowed up considerably at this time. At any rate, large rafts of ducks were on lakes in the periphery area of the storm. Unusual numbers of paired blue-winged teal were noted on the temporary ponds in Area VIII on May 7 and 8. Unusual numbers of blue-winged teal were noted in Areas X and XI as will be discussed later. Mr. Arthur S. Hawkins was contacted during the week of May 10 after he had just returned from Canada and his comment was that much of the migration had not yet reached the areas he had visited.

#### Breeding Population Trends

The breeding pair census consisted of comparable auto transects driven in 48 counties. These routes totaled 1866 miles and were run in Game Management Areas II, III, IV, V, VIII, IX, XI, and XII, which include the principal waterfowl breeding range in the State.

This year 5.2 water areas per square mile were tallied compared with 4.6 in 1953, 3.1 in 1952, and 3.5 in 1951. This increase in water areas was due largely to excesses in Areas II, III, and IV from the melting snow and some rains. Actually Areas V, VIII, IX, X, XI and XII had fewer water areas this year and Area X was about the same. In these areas the drought conditions of the fall of 1953 had lowered water levels considerably and many water areas had low levels in May 1954.

This year 3.17 pairs of ducks per square mile were recorded compared with 2.41 in 1953, 1.89 in 1952, and 1.24 in 1951. Offhand these figures would indicate an increase in the breeding duck population of the State. However, an examination of the data by areas gives somewhat of a different outlook. In the north, fewer pairs were seen in Areas II and III and in Area IV the number was slightly above what it was last year. In the central part of the State, a slight increase was noted in Area V, and a definite decrease is shown for Areas VIII and IX. In the south, a substantial decrease is shown for Area XII, however, for Area X an increase of nearly 200 percent was

#### \* Continued

Area VIII, Forrest B. Lee, St. Paul; Area IX, Robert I. Benson, Glenwood; Area X, Gerald T. Bue, Marshall; Area XI, Maynard M. Nelson, Fairmont; and Area XII, William H. Longley, Kasson. Clare L. Johnson and members of his duck lake survey crew gave valuable assistance in brood counts.

noted and in Area XI the increase was over 400 percent.

The over-all picture is that five Game Management Areas had fewer pairs, two had about the same or a slight increase, and two had a very large increase.

An examination of the field data of Areas X and XI showed that the increase was almost entirely in blue-winged teal pairs, other species being present in about the usual abundance. The transects in Areas X and XI were driven on May 7 and 8. The blue-winged teal were paired up and were well distributed. However, such a count seemed so unreasonable that on May 19 and later that week the Biologists of Area XI and Area VIII got together and ran a reconnaissance in Area XI. At this time many fewer pairs of blue-winged teal were seen than had been recorded earlier. Apparently many of the blue-winged teal recorded on May 7 and 8 had moved out since then. This also seemed to be the case in Area X.

Upon reviewing the situation it seems that a quite unusual set of circumstances had occurred. Phenologically, the vegetation and season in general had reached the stage on May 7 and 8 that is generally considered proper for the driving of the transects. Ordinarily, the spring migration would have passed through by this time for all practical purposes of the census. However, this year migrant blue-winged teal were present later than usual. Possibly they had moved back south due to the stormy, blizzardy, inclement weather that existed further north. The Area XII Biologist had sensed that situation and waited until May 17 and 18 to drive his routes even though census conditions were quite difficult at that time.

Thus, it is probable that the increase shown by the data summary is in error. One possibility for getting an idea of the actual situation was to substitute the 1953 count of blue-winged teal for the 1954 count for Areas X and XI. This was done and the number of pairs per square mile becomes 2.18 compared with 2.41 last year. The writer of this report believes that the actual breeding duck population was relatively low in at least the southern half of the State. Breeding conditions were generally good after the storm of early May. It is likely that if any nesting loss occurred then, that renesting would take place since it was so early in the season.

#### Success of the Season

The early part of June was generally favorable for nesting. The Fergus Falls area, however, received 2.24 inches of rain on June 7; one inch was recorded at Thief River Falls on June 11.

June 14 - 16 was a period of high winds and rain in west-central and northwestern Minnesota. At Thief River Falls, 1.35 inches of rain fell and the wind velocity was measured at over 90 miles per hour. An observer at Thief Lake saw sheets of water whipped up from the surface of the lake. This storm undoubtedly destroyed some of the nests that were over or near the water on larger water areas. The period June 18 - 20 was one of general rains in the State. Southern Minnesota was hit hardest and flooding of pastures and croplands took place in several areas. For example, 5.44 inches of rain fell at Fairmont on these three days. Nests were unquestionably flooded out in some areas.

The months of July and August were drier than usual. Water levels became low in some areas but were not particularly unfavorable for waterfowl production. All in all, except for the snowy weather in early May, the spring and summer of 1954 were generally favorable for nesting and brood rearing. Rainstorms occur in June in most years.

This year brood counts were made earlier than usual which proved to be a mistake. The counts were made early so that we could have some production information to present at the July 6 meeting of the Mississippi Flyway Council in St. Louis. The meeting was hurried and the production information was not discussed. Thus, the following brood data are not strictly comparable with the 1952 and 1953 counts since some of the counts were made as much as ten days earlier than in these years.

Brood counts were made on 55 water areas and pothole transect routes in the period May 23 - July 2. The brood counts were made in all parts of the State. The most notable feature of the counts was the scarcity of broods. A total of 137 broods was seen in all.

Thirty of the brood count areas had been censused both in 1952 and 1953. On these areas, only 60 broods were recorded this year compared with 132 in 1953 and 231 in 1952. Most of the broods (63 percent) were of Class I age. It is possible that the counts were made while the main hatch of the spring was coming off.

Average brood sizes were quite large. The over-all average brood size was 7.5, compared with 7.2 in 1953 and 7.4 in 1952. Brood sizes ran large for mallards, blue-winged teal and ringnecks which are the principal breeding ducks of the State. Most mallard broods were in the Class I and Class II age groups. The absence of mallards and other ducks in the Class III group indicates that real early nests may have been destroyed by the snowstorm in May. Nearly all blue-winged teal and ring-neck broods were of Class I indicating that a hatch was in progress for these species when the counts were made.

In summarizing the situation as it appeared in early July, it looked like production was low in numbers of broods. Broods observed, however, were of a good size, generally. The data were not strictly comparable with those of previous years so additional brood study was necessary to evaluate the situation. The abnormal weather of early May had posed the question of whether the spring breeding pair census really represented the abundance of our breeding duck population.

The banding crews went afield on July 12 and it soon became apparent that our duck production was very poor. One of the biggest problems of some of the crews was in finding enough young ducks to band in areas that contained good habitat. The scarcity of broods was particularly noticeable in the southern half of the State. In many localities, adult ducks were scarce, indicating that ducks recorded on the spring breeding ground survey may have moved out after the survey was made.

Much of our brood work, particularly second and third counts, was eliminated in order that we could emphasize the banding program. However, fortunately three counts were made in two areas and the data illustrate the scarcity of broods.

Robert I. Benson made brood counts during June, July, and August in Area IX in 1953 and 1954 on transect routes in Big Stone and Pope Counties. On the Big Stone County route, which is 26 miles long and which contains approximately 65 water areas, only one duck brood was seen this year compared with 22 broods in 1953. Coots were much scarcer than previously.

The Pope County route is 27 miles long and contains about 70 water areas. Six duck broods were counted this year compared with eight broods in 1953. The change is not great but the data illustrate a very low production for both years. Mr. Benson conducted an intensive study of 15 small water areas in Pope County during 1950, 1951 and 1952, and waterfowl production was found to be very low during these years.

William H. Longley made three brood counts on waterfowl areas in Area XII. His comments regarding Oak Glen Lake, Steele County, are quoted as follows: "There seems to be little possibility of comparing the 1953 and 1954 data with preceding years' data in more than a general way, because of the change of methods. Some things are apparent, however. The number of broods at Oak Glen and the variety of species nesting near there have diminished. Drainage has removed much nesting cover and many 'territorial' water areas. Dry weather also appears to be having some effect as some small sloughs dried up noticeably earlier this year. In 1950, I counted 22 broods from shore at Oak Glen. In 1951, fourteen broods were seen. Since then only six or seven have been found there each year even though an extra count has been made in the last three years."

Extensive brood work was done this summer on the Roseau River Refuge as part of the study of that area. However, the data probably do not represent that general part of the State due to changes in conditions of such a newly flooded area.

### Banding

Four banding crews worked in Minnesota during July and August. A total of 2961 waterfowl was banded. The breakdown by species is as follows: blue-winged teal, 2162; mallard, 260; ringneck, 168; redhead, 99; baldpate, 58; canvasback, 54; pintail, 45; shoveler, 32; gadwall, 22; green-winged teal, 9.

# WATERFOWL SURVEY CHIPPEWA NATIONAL FOREST-MINNESOTA, 1937 - 1954

William J. Ellerbrock, Jr.

## Introduction

The annual Chippewa National Forest waterfowl survey was taken for the thirteenth time since 1937. Minnesota Conservation Department Biologist John Zorichak, Army Engineer Biologist R. W. Buselmeier, U. S. Game Management Agents Loren J. Bonde and William J. Ellerbrock conducted the census production studies during the week of July 12 - 16, 1954. The methods and times were the same as previous years.

## Water Conditions

Except for Mud Lake, the water levels on all areas were about the same as last year, 10.5 at the Winnibigoshish Dam. Due to heavy rains the level of Mud Lake raised 1.5 feet between June 24 and July 12, 1954. Aquatic vegetation was more abundant than last year, especially the Third River area. The wild rice looked good in all areas except Mud Lake which appeared to be damaged by the recent change in water level.

## Breeding Population

Table I illustrates the results of the 1954 breeding population as compared with previous years.

Table I. Breeding Population of 1954 as Compared with Previous Years.

Area	1939									Change
	1940	1947	1948	1949	1950	1951	1952	1953	1954	From 1939
Bowstring Lake	519	498	416	337	521	545	263	120	285	- 234
Burns Lake	215	107	170	84	108	103	231	29	126	- 89
Kitchi Lake	241	168	239	48	69	161	246	117	165	- 76
Lower Pigeon Lake	28	5	24	30	57	35	50	12	26	- 2
Mud Lake	181	230	271	200	81	45	24	9	110	- 71
Rabideau Lake	94	119	215	49	64	140	193	153	185	+ 91
Raven Lake	198	33	22	17	25	18	128	22	1	- 197
Round Lake	580	490	606	574	382	565	714	261	198	- 382
Third River	650	420	1010	526	301	1019	239	61	258	- 392
L. Winnibigoshish	568	262	88	224	157	202	104	142	98	- 470
Total	3 274	2332	3108	2089	1765	2833	2192	926	1452	-1822 59%

Species Composition: The six main species of breeding ducks on the Chippewa National Forest area have been the mallard, baldpate, golden-eye, ring-neck, blue-winged teal and wood duck. Table II illustrates the species composition encountered since the inception of the census.

Table II. - Species Composition.

Year	Mallard	Baldpate	Golden-eye	B-w. Teal	Wood duck	Ring-neck	Other
1937	32	5	20	22	-	13	8
1938	49	3	10	23	-	9	6
1939	45	4	15	28	-	5	3
1940	44	7	15	21	-	10	3
1941	47	12	11	14	-	4	6
1947	49	15	19	7	-	5	6
1948	52	17	13	10	-	8	3
1949	44	24	19	6	-	4	3
1950	43	30	17	4	-	4	2
1951	46	27	17	4	3	2	1
1952	48	27	12	4	1	2	-
1953	36	22	34	4	2	1	1
1954	37	27	22	9	1	4	-

The species composition for 1954 gives a fairly true picture in regard to mallard, baldpate, golden-eye and blue-winged teal. The population of ring-neck will be materially increased by the number of mated pairs observed during the census.

#### Production

Brood averages: Table III illustrates brood averages for the mallard duck for each year since 1937. The brood average of Class III mallards for the total survey area was 5.5 comparable to the 6.5 all time average.

Table III. - Brood Averages for the Mallard - 1937-1954.

Year	I	II	III	All	No. of Broods
1937	-	6.3	6.5	6.5	56
1938	8.8	7.8	6.5	7.3	166
1939	8.8	7.6	7.4	7.8	256
1940	8.7	7.4	7.0	7.8	94
1941	-	7.3	6.7	6.9	17
1947	7.8	7.9	7.0	7.5	67
1948	7.1	7.6	6.8	7.2	102
1949	4.8	6.8	6.7	6.4	31
1950	8.1	7	6.6	7.0	49
1951	6.6	6.8	6.3	6.5	92
1952	4.5	7.2	6.7	6.6	127
1953	7.5	5.7	5.6	5.9	18
1954	7.8	7.0	5.5	6.6	44

During the 1954 survey Class III broods exceeded Class I broods by two-thirds and exceeded Class II broods by about one-third. Maternal hens and incomplete broods were not included in the figures.

Adult-juvenile ratios - 1953 and 1954: Table IV illustrates adult-juvenile ratios for all ducks seen on the census for both 1953 and 1954.

Table IV. - Adult-Juvenile Ratios for All Ducks Seen on Census for 1953 and 1954.

Species	1953			1954		
	Adults	Juveniles	Ratio	Adults	Juveniles	Ratio
Mallard	164	170	1:1.0	113	429	1:3.8
Baldpate	101	104	1:1.0	83	307	1:3.7
Golden-eye	58	256	1:4.4	112	209	1:1.9
B-w. teal	7	24	1:3.4	20	107	1:5.3
Ring-neck	10	-	-	29	23	1:0.8
Wood duck	6	13	1:2.1	8	5	1:0.6
Other	4	7	1:1.7	4	3	1:0.8

The ratio of adults to juveniles for all species for each year of the census is as follows:

1937	1938	1939	1940	1941	1947	1948	1949	1950	1951	1952	1953	1954
1:3.0	1:2.2	1:3.4	1:1.5	1:2.7	1:2.2	1:4.0	-	1:2.7	1:2.8	1:3.4	1:1.6	1:2.9



### Conclusion

The water level at the Winnibigoshish Dam was comparable with the 1953 level. Except for the first week in May, water levels raised gradually from 9.50 on May 1, 1954, to 10.71 on May 31, 1954. On May 2, 1954, 14 inches of snow fell in the census area. Vegetation was more abundant than during the previous year resulting in poor censusing of the Third River area.

From the data it appears that adult populations were down, that we had a decrease of 59 percent compared with 1939-40 census which was considered as par for the area and a 15 percent increase over 1953 census.

## WATERFOWL BREEDING GROUND SURVEY - IOWA, 1954

James G. Sieh

### Introduction

Breeding pair and brood studies have been carried on during routine on-the-sport check counts in the prairie marsh areas of northwestern Iowa since 1949 to evaluate the trend of nesting waterfowl other than wood ducks. Wood duck stream surveys were begun in 1953 and repeated in 1954 in an attempt to determine wood duck production trends (see Figure 1). Wood duck nesting box checks have been completed on the Lake Odessa area in Louisa County to determine nesting box utilization and to evaluate production each year since 1950 (Table I). Random nesting box checks have been made intermittently in northwest Iowa since 1949.

Aerial survey of the prairie marshes was begun in northwest Iowa using a lineal census technique which was modified in 1953 and 1954 to attempt total counts on individual lakes, sloughs, and marshes.

### Spring Migration

Migrating mallards and pintails arrived in the lakes region of northwestern Iowa with warm southerly winds of a frontal system moving into and across Iowa on March 16, 1954. Ten days later concentrations of redheads and smaller numbers of canvasback were present in the lakes region, and by April 5 peak numbers of divers, especially lesser scaup and ring-necked duck, were present. Extremely warm temperatures in early April and unusually cold, freezing weather in early May probably accounted for the large concentrations of blue-winged teal in the State. Large shifts of migrants through the lakes region have not been recorded since 1942, and the large increases in 1954 bring to mind increases in migratory numbers reminiscent of, but not equal to migrant numbers recorded in the early thirties.

### Waterfowl Production

On-the-spot check counts in the prairie marshes of northwest Iowa each spring and summer since 1949, plus aerial coverage of the same marsh units since 1952, have provided a studied opinion as to the production trends of blue-winged teal and mallards. Blue-winged teal constitute the most numerous nesting species in the remaining prairie marshes, and the mallard is not far behind. Production of these two species in 1954 remained about the same as in 1952 or 1953 with no appreciable change in nesting numbers. With the exception of increased production in 1951 which

resulted from optimum water levels, excellent nesting and survival conditions, the production trend of ground nesting species, especially blue-wings, and mallards, tend to remain about the same under average phenological conditions. During the last five years of systematic observation, 1951 marks the only year when a large increase of breeding stock occupied the many temporary potholes and nested successfully.

On a few diving ducks, including redheads and ruddies, continue to nest each year in Iowa. These species are so few in number that no attempt has been made to evaluate their production trend. Adult lesser scaup have remained in northwest Iowa throughout the nesting season, but no nests, broods, nor young have been observed. Nesting attempts of ring-necked ducks have been reported during the last few years, but like the lesser scaup no evidence of successful nesting has been witnessed. A very few pintails, shovelers, and gadwall nest in the State but too few to indicate a trend.

Special emphasis has been placed upon the study of the wood duck because it has again become an important nester during the last fifteen years, and Iowa's contribution to the over-all production of this species is important within the flyway. This State is reputed to contain from 11,000 to 16,000 miles of stream and rough estimates from stream surveys indicated about one pair of wood ducks to every two to four miles of good stream habitat in 1953. In 1954 both stream survey data and wood duck nesting box checks indicated reduced breeding populations of wood ducks within the State (Table I and II).

The productive potential of the wood duck in Iowa is not well understood, nor is the size of the standing crop. The nesting density of this species and its range throughout the State has increased during the last ten years, but it is probable that 1949 or 1950 may have been peak years for wood duck production, and that the trend since then has been downward. Many wood ducks harvested in Iowa are probably young birds produced within the State or in neighboring States. The harvest of the past season may be a partial indicator of past production and in some measure indicative of current breeding stock remaining. It is noteworthy that when the waterfowl season has opened in Iowa on October, that the removal of potential breeding stock has been reduced roughly one-third in Iowa, (Table III).

Table I. - Wood Duck Nesting Box Success at Lake Odessa, Louisa County, Iowa.

	1950	1951	1952	1953	1954
Number of nesting boxes available	26	36	24	30	72 (22 wood type) (50 metal type)
Number of nesting boxes occupied	18	13 pre-flood 9 post flood	18	15	11 (7 wood duck) (4 merganser)
Number of nests destroyed by flood	0	13	0	0	0
Number of eggs destroyed by flood	0	108 wood duck	0	0	0
Total number of potentially successful eggs	158	72 wood duck 0 merganser	237* wood duck 38 merganser	111 wood duck est. 17 merganser est.	Not estimated insufficient evidence
Number of successful nests	11	6	? **	? **	? **
Number of ducklings successfully hatched	129	68	? **	? **	? **

\* Abnormal success in 1952 was caused by flooding of other nesting cavities and subsequent large scale dump nesting in these nesting boxes raised up above flood crest; the success does not indicate production trend.

\*\* Student observer not available on full time basis and consequently data not available.

Table II. - Wood Duck Stream Survey Data.

Survey Route Number and Miles Censused	Wood Ducks Counted				Total	Date of Census
	M*	F**	Prs.***	Und.****		
1. 8 miles	-	1	-	4	4	May 9, 1953
8 miles	1	1	-	-	2	May 11, 1954
2. 7 miles	-	-	-	4	4	May 11, 1953
route abandoned in 1954 because stream channel straightened						
3. 7 miles route established in 1954	1	0	2	-	5	May 11, 1954
4. 11 miles	3	2	6	-	17	May 13, 1953
11 miles	2	2	-	2	6	May 6, 1954
5. 13 miles	1	-	1	-	7	May 14, 1953
13 miles	1	1	-	-	2	May 13, 1954
6. 12 miles route established in 1954	3	-	-	1	4	May 10, 1954
7. 18 miles	6	5	-	4	15	May 5, 1953
18 miles	1	-	1	5	8	May 7, 1954
8. 9 miles	1	-	1	-	3	May 6, 1953
9 miles	-	1	-	-	1	May 5, 1954
66 miles total all routes	11	7	10	12	50	May 5-14, 1953
78 miles total all routes	9	5	3	8	28	May 5-13, 1954

\* Males

\*\* Females

\*\*\* Pairs

\*\*\*\* Unidentified as to sex

Table III. - Recorded Kill Samples of Wood Ducks in Iowa since 1948.

	1948	1949	1950	1951	1952	1953
No. of wood ducks reported from all Iowa counties	114	133	148	464	427	321
Percentage of wood ducks in total mixed bag sampled in all Iowa counties.	1.9%	2.3%	3.2%	3.3%	6.8%	3.7%
No. of wood ducks reported from ten Miss. R. counties	50	44	81	138	223	154
No. of Miss. R. counties reporting	8	5	7	9	9	8
Percentage of total wood ducks sample from the Miss. R. counties	43.8%	33.0%	54.7%	29.7%	52.2%	47.9%
Opening dates of waterfowl seasons: October	29	21	20	12	8	8

# IOWA

WATERFOWL BREEDING GROUND SURVEY  
1954

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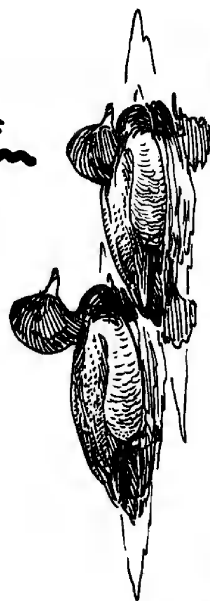
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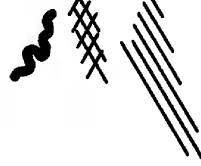
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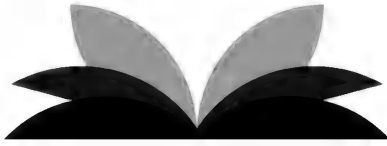
WOOD DUCK STREAM SURVEY ROUTES

" " " NESTING BOXES CHECKED

LAKES, MARSHES ETC



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## WATERFOWL NESTING SURVEY - MISSOURI, 1954

Lewis G. Helm

### Introduction

Since 1951 a waterfowl nesting survey has been conducted in Missouri, primarily for the purpose of obtaining trend data of summer resident wood ducks. Included in the survey are observations of the nesting attempts of mallard and blue-winged teal. The survey is conducted by conservation agents, who in the 1951 survey found wood ducks nesting in their districts. This year 45 agents censused 4931 acres of lake and marsh and 218 miles of stream. Managers of five State and Federal areas contributed information on nesting waterfowl, and 12 Federal-Aid biologists ran census routes on 363 miles of stream.

As in previous years, the following observations were recorded as nesting attempts: lone drake, lone hen, pair and brood. The total nesting effort was computed as the total of all these observations. The census was carried out during the period May 10 to June 10.

Table I summarizes the data recorded during the survey. Omitted are single observations of shoveler, pintail, gadwall, green-winged teal, lesser scaup, canvas-back, hooded merganser, and coot. Table II shows trend data for the 1953 and 1954 nesting surveys, and Table III gives trend data for wood ducks only.

### Summary

Nesting waterfowl surveys have been conducted on areas and streams in Missouri since 1951. Based on the number of nesting attempts observed per square mile of lake and marsh and per mile of stream, a downward trend has been recorded. For wood ducks, mallards, and blue-winged teal, nesting attempts are down 31 percent on lakes and marshes and 18 percent on streams. For wood ducks only, nesting attempts are down 24 percent on lakes and marshes and 8 percent on streams.

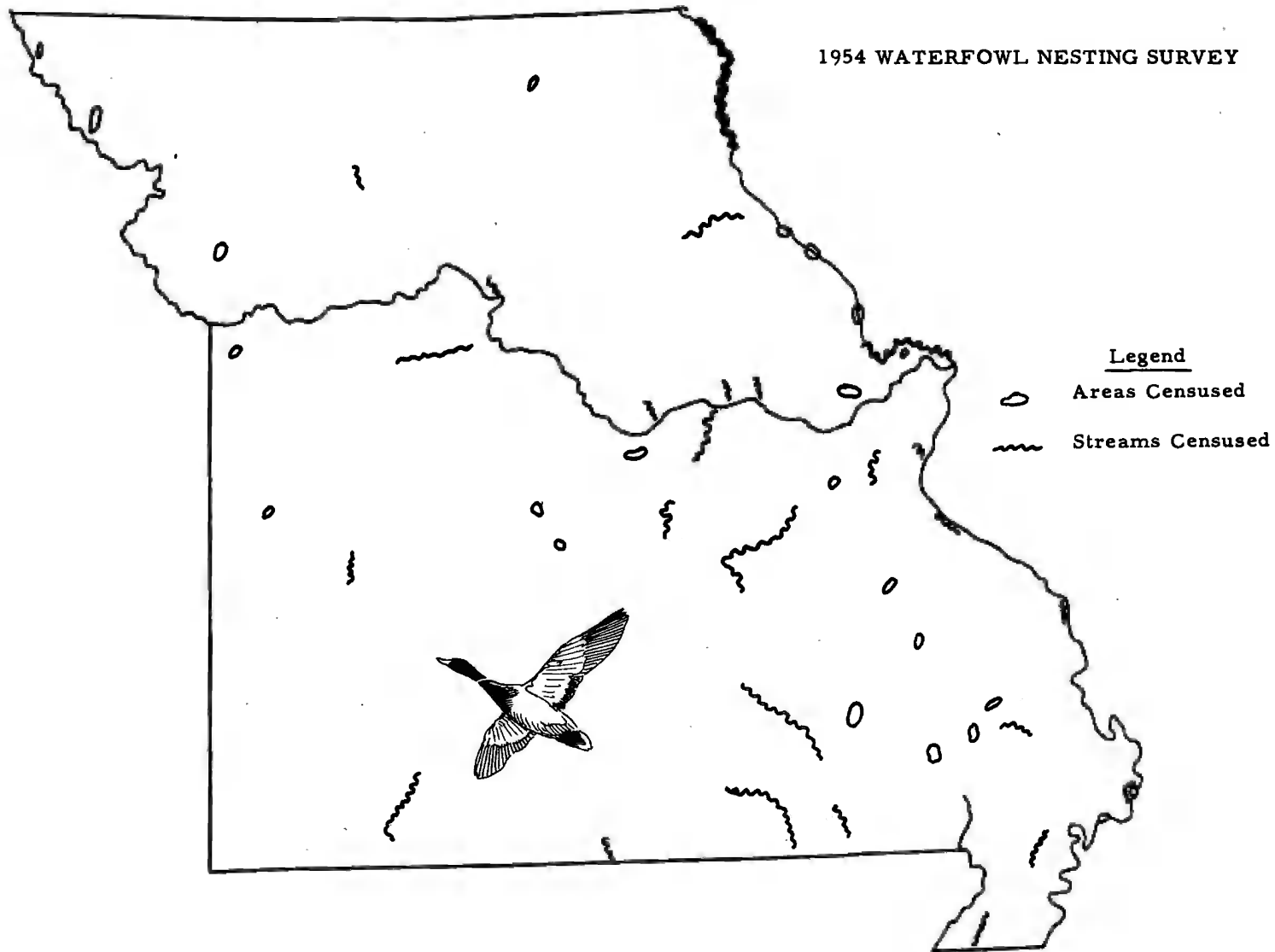
Table I. - Nesting Efforts Per Census Unit - Waterfowl Nesting Survey in Missouri  
May 10 to June 10, 1954.

4931 Acres of Lake and Marsh	Lone Drake	Lone Hen	Pairs	No.	Broods		Total Nesting Effort	Nesting Effort Per Square Mile
					Total Young	Young/ Brood		
Wood duck	17	2	10	5	29	5.8	34	4.4
Mallard	11	0	5	2	21	10.5	18	2.3
Blue-winged teal	0	0	3	0	0	0	3	.4
<hr/>								
Lake and Marsh Totals	28	2	18	7	50	9.1	55	7.2
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581 Miles of Stream								
Wood duck	42	25	33	26	164	7.1	129	.22
Mallard	6	6	0	2	13	6.5	14	.02
Blue-winged teal	24	10	24	0	0	0	58	.10
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Stream Totals	72	41	57	28	177	6.3	201	.35
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Grand Total	100	43	75	35	227	6.5	256	-

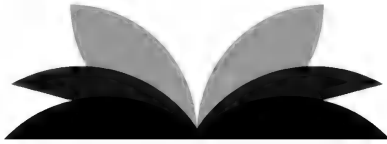
Table II. - Wood duck, Mallard, Blue-winged teal Trend Data - Waterfowl Nesting  
Surveys - Missouri, 1953-1954.

	1953	1954	Percent Change
Acres of lake and marsh censused	4976	4931	-
Nesting effort per square mile	10.5	7.2	-31
Miles of stream censused	371	581	-
Nesting effort per mile of stream	.43	.35	-18
Number of broods observed	45	35	-22
Number of young observed	215	227	+ 6
Average young per brood	4.8	6.5	+35

1954 WATERFOWL NESTING SURVEY



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Table III. - Wood duck Trend Data - Waterfowl Nesting Surveys - Missouri, 1953-1954.

	1953	1954	Percent Change
Acres of lake and marsh censused	4976	4931	-
Nesting effort per square mile	5.8	4.4	-24
Miles of stream censused	371	581	
Nesting effort per mile of stream	.24	.22	- 8
Number of broods observed	42	31	-26
Number of young observed	202	193	- 4
Average young per brood	4.8	6.2	+22

## WATERFOWL BREEDING GROUND AND PRODUCTION SURVEYS IN WISCONSIN - 1954

Laurence R. Jahn

### Introduction

The randomized, spot-type sampling system was again used to determine the trend in the Wisconsin waterfowl breeding population. This method has been employed each year since 1951. Prior to 1951, extensive ground and aerial transect techniques were used.

The 20 district game managers of the five administrative state areas of the game division conducted the field work for the waterfowl surveys. Advisory help was given this group of men by personnel of the Pittman-Robertson waterfowl research project (W-4-R).

### Methods and Descriptions

For a detailed discussion of the methods used to follow trends in the State waterfowl production picture, see U. S. Fish and Wildlife Service Special Scientific Report: Wildlife No. 12 (1951), or Wisconsin Wildlife Research 10(3):10-24 (1951). The system used in 1951 was modified slightly this year. The highlights of the sampling system and the modifications are described here.

1. Each game manager, except in district 10 of game area 3 and district 17 of game area 5, was asked to census at least 15 water areas in his district by ground. Each district was requested to cover at least 75 percent of the same water sites censused in 1953. It was suggested that the game managers drop a few undesirable census areas, but not more than 25 percent of the total sites per district. No aerial work was carried out.

- a. The water sites were censused once during the breeding ground survey from May 10 - 29 during regular working hours. The same water areas were covered once during the production survey from June 28 - July 10, between 4:00 and 8:00 a.m. The hour and one-half immediately preceding sunset was also used for running production surveys in a few cases.
- b. The 20 game districts in the State were again divided into three groups. Each group had different calendar dates for conducting the waterfowl surveys to correct for widely varying phenological differences.

2. Managers were urged to census water sites ranging in size from 1/4 acre to 10 acres. In districts where such areas were scarce, lakes and flowages were covered. A few rivers and streams were censused in the northern part of the State.

3. Water areas were classified as to size and type on the first coverage (Table 1). The size of a site is the estimated number of censused acres, including the zone of emergent vegetation. The water area classification included:

- A - Permanent, less than 10 acres in size.
- B - Semi-permanent (dependable except in dry years).
- C - Temporary (dry by late summer except in wet years).
- F - Flowage.
- L - Lake (any permanent body of water, not streamlike, which is 10 acres or larger in size).
- S - Stream.

4. To follow water conditions experienced during these surveys, the water levels found during the production survey were compared with the water levels found during the breeding-ground survey using the following terms.

- |                 |                     |
|-----------------|---------------------|
| NC - No change. | L - Less water.     |
| M - More water. | D - Completely dry. |

5. Date on waterfowl species were recorded in the usual way.

A total of 289 water sites were censused. They were distributed Statewide in 35 of the 71 State counties (Figure 1). Table 1 gives the number of different types of water areas and the total acres censused on the first coverage.

#### Weather and Water Conditions

Precipitation for the period of September 1, 1953 to March 1, 1954 was approximately 56 percent of normal. During March and the first half of April, 1954, precipitation was slightly below normal. Heavy rains during the last half of April brought the total for the month to 2.79 inches above normal. Temperatures for the months of February, March and April were normal or above normal. Spring migrant waterfowl moved into Wisconsin rather early and found very few temporary feeding and loafing areas. The major northward push of migrant waterfowl from Wisconsin occurred during the last 12 days of April. The weather bureau estimated that farm field work was about one week behind average by May 1.

Waterfowl nesting started about one week later than the slightly early year of 1952 and is considered average, as compared to the past five years.

The heavy rains of late April undoubtedly caused some destruction of early mallard nests in certain localities. Heavy rains in certain regions in June may have caused further nest losses, especially to later nesting species such as the blue-wing teal. However, the Statewide loss of waterfowl nests due to flooding should be minor since the two main species breeding in Wisconsin, the mallard and blue-wing teal, are primarily upland nesters. In certain types of water sites broods were more difficult to observe due to the additional vegetation which was flooded. This factor makes it necessary to qualify the results of the 1954 brood counts.

Table 1. - Water Area Classification for 1954 Wisconsin Waterfowl Breeding Surveys

Game Mgmt. Area	Game Mgmt. Dist.	Type of Water Area and Number Occupied by Waterfowl											
		A		B		C		F		L		S	
		Total No.	Occu- pied	Total No.	Occu- pied	Total No.	Occu- pied	Total No.	Occu- pied	Total No.	Occu- pied	Total No.	Occu- pied
I	1	3	0	4	3	1	0	0	0	12	7	0	0
	2	7	1	13	9	2	2	1	0	7	1	0	0
	3	6	2	3	0	2	0	0	0	5	1	0	0
	Total	16	3	20	12	5	2	1	0	24	9	0	0
II	4	2	0	2	1	0	0	5	4	3	3	5	5
	5	12	6	4	0	0	0	2	2	2	2	0	0
	6	7	3	5	1	0	0	2	0	3	2	0	0
	Total	21	9	11	2	0	0	9	6	8	7	5	5
III	7	14	7	0	0	0	0	0	0	8	7	0	0
	8	(N o C o v e r a g e)											
	9	10	9	2	2	0	0	0	0	3	3	0	0
	Total	24	16	2	2	0	0	0	0	11	10	0	0
IV	11	1	1	7	3	0	0	1	1	7	4	0	0
	12	0	0	0	0	0	0	4	3	12	12	0	0
	13	5	3	1	0	0	0	0	0	10	10	0	0
	14	7	6	6	6	0	0	0	0	2	1	0	0
	15	12	2	1	0	0	0	1	1	3	3	0	0
	Total	25	12	15	9	0	0	6	5	34	30	0	0
V	16	5	5	5	5	2	2	0	0	4	4	0	0
	18	6	3	5	3	2	1	0	0	2	1	0	0
	19	1	1	0	0	4	4	0	0	1	1	0	0
	20	7	5	1	1	7	5	0	0	0	0	0	0
	Total	19	14	11	9	15	12	0	0	7	6	0	0
Grand Total		105	54	59	34	20	14	16	11	84	62	5	5



Table 1 (Continued).

Game Mgmt. Area	Game Mgmt. Dist.	Total No. Areas	Total Occupied Areas	Acreage of Water Types						Total
				A	B	C	F	L	S	
I	1	20	10	23	24	3	0	304	0	354
	2	30	13	37	42	1	30	175	0	285
	3	16	3	40	9	1	0	80	0	130
	Total	66	26	100	75	5	30	559	0	769
II	4	17	13	13	5	0	275	120	176	589
	5	20	10	29	4	0	35	50	0	118
	6	17	6	24	6	0	15	50	0	95
	Total	54	29	66	15	0	325	220	176	802
III	7	22	14	44	0	0	0	135	0	179
	8		( N o	C o v e r a g e )						
	9	15	14	46	5	0	0	35	0	86
	Total	37	28	90	5	0	0	170	0	265
IV	11	16	9	8	12	0	40	216	0	276
	12	16	15	0	0	0	140	362	0	502
	13	16	13	22	1	0	0	395	0	418
	14	15	13	15	15	0	0	80	0	110
	15	17	6	28	.2	0	20	40	0	88
	Total	80	56	73	28.2	0	200	1093	0	1394
V	16	16	16	24	21	8	0	93	0	146
	18	15	8	29	17	4	0	50	0	100
	19	6	6	1	0	3	0	18	0	21
	20	15	11	34	1	25	0	0	0	61
	Total	52	41	88	39	40	0	161	0	328
Grand Total		289	180	417	162.2	45	555	2203	176	3558

Of 289 water sites censused twice during these surveys, 82 percent showed no change or more water during the second coverage as compared to the first coverage (Table 2). During June and early July above normal precipitation was experienced.

### Breeding Population Trends

The principal breeding ducks in Wisconsin are the blue-winged teal, wood duck, mallard, black duck, and ring-necked. The mallard and ring-necked did not demonstrate any change in breeding pairs in 1954 as compared to 1953, the blue-winged teal and black duck decreased only slightly, and the wood duck showed a fair increase (Table 3). The coot or mud hen showed an increase over 1953 in the total numbers present on the study areas.

Each year since 1951, the percent of water sites surveyed that were occupied by ducks during the breeding pair survey has increased. In 1951, 55 percent were occupied, while this year 64 percent held birds. The number of breeding pairs of ducks observed per acre this year, was about the same as in 1953. The indication is that the breeding duck population did not increase in size over 1953, but that the breeding ducks utilized a greater share of the more permanent water sites which are covered by our surveys.

Of the flocked birds observed this year, a greater percent was made up of female ducks than in any year since 1951. The implication is that due to the heavy rains of late April, some of the birds did not breed, or they did not renest after nest destruction took place.

### Production Trends

Complete counts on 123 broods gave an average of 7.0 ducklings per brood. An estimated total 626 pairs of breeding ducks produced 148 broods. Therefore, 626 pairs of ducks produced an estimated total of 1036 ducklings. Indicated known minimum duck production in Wisconsin during 1954 was 1.65 young per adult breeding pair.

Data on the average brood size of each species are summarized in Table 4. Table 5 summarizes the breeding pair and production trends for the period 1951-1954.

Confirmed records of free-flying Canada geese breeding in Wisconsin were grouped around areas where the birds have been found nesting successfully in previous years. Goslings were produced at the Suamico Game Sanctuary and the Bay Beach Wildlife Refuge (both in Brown county), the Horicon Marsh and water areas in the vicinity of the marsh (Dodge county), Lake Maria (Green Lake county), and the Central Wisconsin Conservation Area (Jackson and Juneau counties). Reports were also received indicating the presence of adult Canadas after June 1 in Adams, Brown, Jefferson, Lincoln, and Wood counties. It is doubtful if any of these birds nested successfully.

Table II. - 1954 Wisconsin Waterfowl Breeding Surveys and Water Conditions  
on the Second Coverage

Game Area	Number of Water Areas Showing				Percent Showing more water or no change
	No Change	More Water	Less Water	Completely Dry	
I - NW	24	41	1	0	99
II - NE	25	1	28	0	48
III - WC	19	17	0	1	97
IV - EC	19	44	17	0	79
V - S	17	29	5	1	88
Total	104	132	51	2	82

Table III. - Wisconsin Waterfowl Breeding Pair Trends\*

Species	Average Index 1951 thru 1953		1953		1954		% Change of 1954 Index from Average 1953	
			Index	% Lone M	Index	% Long M		
Mallard	.03	prs/acre	.05	59	.05	45	+ 67	No Change
B-w. teal	.05	prs/acre	.09	32	.08	21	+ 60	- 11
Black duck	.004	prs/acre	.007	-	.008	-	+100	- 14
Wood duck	.005	prs/acre	.006	45	.01	39	+100	+ 67
Ringneck	.008	prs/acre	.01	29	.01	65	+ 25	No Change
Total Ducks	.10	prs/acre	.18	38	.18	28	+ 80	No Change

	Average of 1951 - 1953		1953	1954
Adult coot observed/acre	.020		.049	.089
% Change of 1954 from:	+ 345		+ 82	-

\* Total estimated pairs based on pairs, lone males, lone females, and unidentified duck pairs and single ducks observed. Index figures are based on the number of pairs per acre sampled.

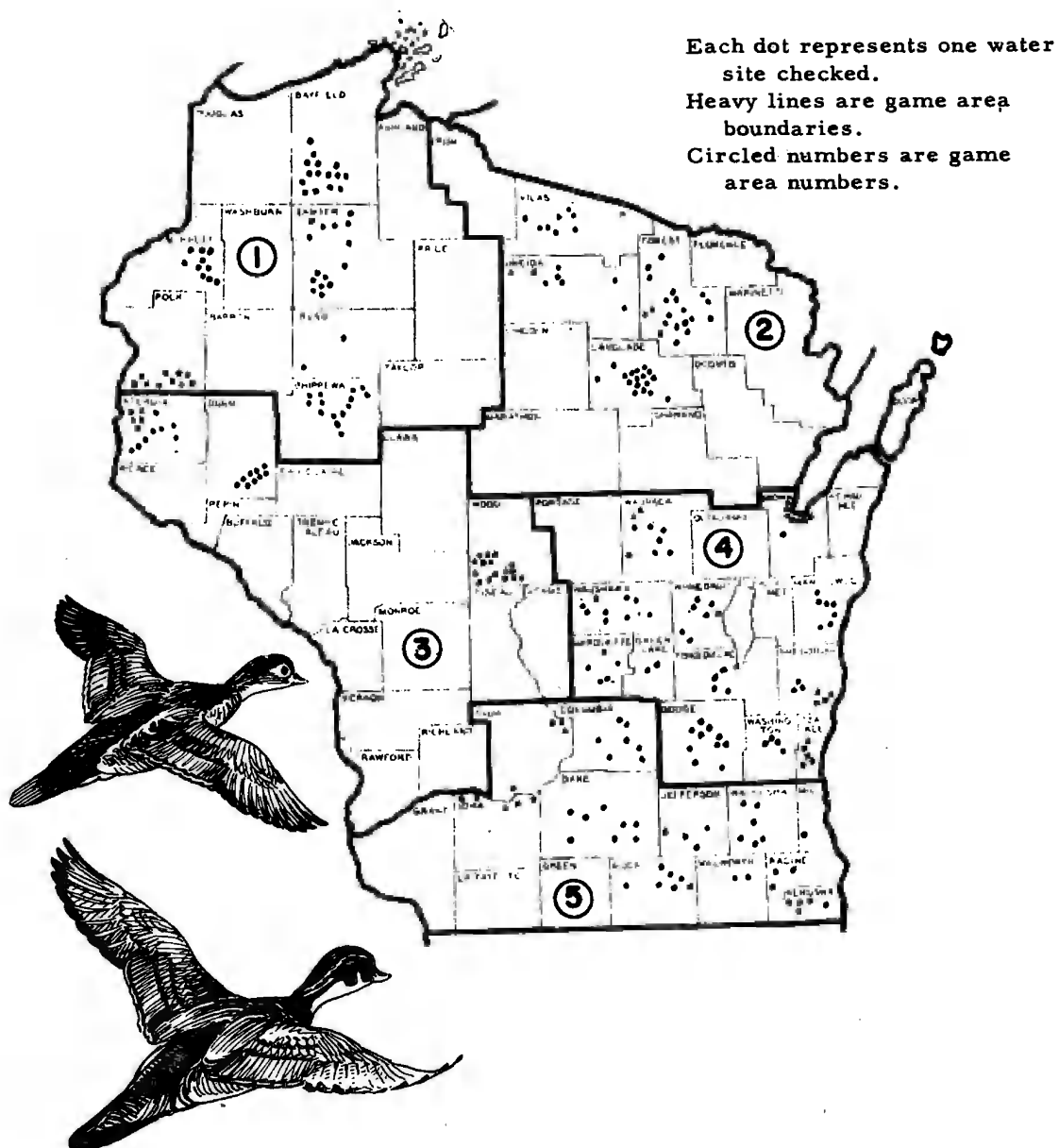
Table IV. - Summary of 1954 Brood Data - Wisconsin Waterfowl Breeding Surveys

Species	Class I			Class II			Class III			Total		
	No. Broods	No. Yng.	Ave. Size	No. Broods	No. Yng.	Ave. Size	No. Broods	No. Yng.	Ave. Size	No. Broods	No. Yng.	Ave. Size
B-w. teal	23	195	8.5	22	164	7.5	2	9	4.5	47	368	7.8
Mallard	5	39	7.8	25	168	6.7	12	81	6.8	42	288	6.9
Black duck	1	10	-	3	14	4.7	8	43	5.3	12	67	5.6
Wood duck	5	48	9.6	0	0	-	3	16	5.3	8	64	8.0
Pintail	0	0	-	1	3	-	0	0	-	1	3	-
Total												
Dabblers	34	292	8.6	51	349	6.8	25	149	6.0	110	790	7.2
Ringneck	3	23	7.7	2	13	6.5	1	6	-	6	42	7.0
Hood. Merg.	1	7	-	5	25	5.0	1	3	-	7	35	5.0
Total												
Divers	4	30	7.5	7	38	5.4	2	9	4.5	13	77	6.0
All Ducks	38	322	8.5	58	387	6.7	27	158	5.9	123	867	7.0

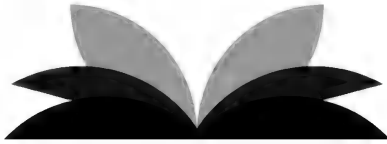
Table V. - Comparison of Wisconsin Waterfowl Breeding Survey Figures, 1951-1954.

Year	Pairs /Acre	Indicated Change	Of Total Flocked Birds, % Female	Young/ Breeding Pair	Indicated Change	Average Brood Size	Indicated Change
1951	.078	-	16%	1.46	-	6.5	-
1952	.092	+18%	19%	2.58	+77%	6.6	+ 2%
1953	.180	+96%	27%	2.35	- 9%	7.0	+ 6%
1954	.176	- 2%	35%	1.65	- 30%	7.0	None

**Figure 1. Approximate Location of Water Areas Censused in 1954.**



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A pair of whistling swans was observed with a brood of four cygnets along the Wisconsin River in Oneida county for the first record of this species breeding in Wisconsin.

### Summary

The spring waterfowl migration arrived in Wisconsin on schedule to find above-normal temperatures and a lack of temporary water areas.

Recognizing (1) that brood observations were made with relatively high water levels existing; (2) that the figure on the breeding duck pairs per acre was about the same as the 1953 high figure; (3) that the average brood size remained high, as it was in 1953; (4) that a greater percent of the female ducks apparently did not nest successfully; and (5) that the young per breeding pair of ducks showed a substantial decrease, it is concluded that waterfowl production in Wisconsin decreased slightly in 1954 from the high level existing in 1953. However, compared to the past three years (1951-1953), the 1954 production level is considered good.

### Summary of Summer Waterfowl Banding Operations

No trapping and banding of wild ducks was carried out between June 15 and September 15. A breakdown of the Canada geese which were banded and released is presented below.

Species	Adult		Immature			Total
	Male	Female	Male	Female	?	
Canada Geese (Wild)	10	3	-	-	-	13
Canada Geese (Propagated)	-	-	44	33	1	78
Snow Geese	1	-	-	-	-	1

## WATERFOWL BREEDING GROUND SURVEY - MICHIGAN, 1954

Herbert J. Miller

### Introduction

This report summarizes the information obtained on waterfowl production in Michigan in 1954.

During the past six years, personnel of the Michigan Department of Conservation have carried on various types of surveys to appraise waterfowl production within the State.

Comparatively, Michigan has a low nesting population that is difficult to census. Dense cover and extensive forested areas dotted with permanent lakes, swales, and beaver ponds, and traversed by a multitude of streams, typify the habitat to be censused. In such areas breeding birds are scattered and are difficult to locate. Experience has demonstrated that under these conditions there are limitations to the accurate determination of waterfowl production. In view of these limitations, efforts were extended to obtain comparative indices through three types of surveys:

1. Brood censuses
2. Spring migration observations
3. Potential breeding population surveys

### Methods Used in Sampling

Ground checks on sample areas, together with aerial censuses to provide more extensive coverage, have been employed for each one of the above mentioned types of surveys. Approved conventional methods of censusing were used for both the ground and aerial surveys.

Ground surveys to provide an index to the breeding population from year to year have been standard as to method and coverage. Coverage by aerial surveys to determine breeding populations and the success of the broods has been altered. Aerial censuses were first tried on special study areas with limited success and were discontinued. In 1952 and 1953, transects were flown across the State in accordance with a systematic sampling design to provide random data that could be treated statistically.

This year, aerial coverage for determining potential breeding populations was reduced to segments of two transects previously flown in the south central part of the State.

Although changes have been made in aerial coverage, comparative data for 1952, 1953 and 1954 are available.



Locations of the sample check areas and the aerial transects are shown in Figure 1.

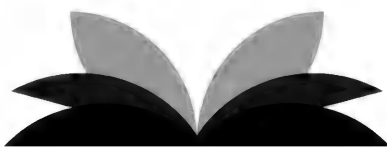
Figure 1



L E G E N D

- Ground surveys on sample check areas
- Aerial transects for censusing breeding pairs
- .....Aerial transects for censusing broods

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### Weather and Water Conditions

Weather conditions and water levels generally have not been conducive to nesting.

Low temperatures, snow squalls and heavy rains may have reduced this year's production. The U. S. Weather Bureau reports April as the fifth wettest April in Michigan since records began in 1887. May was the second snowiest, seventh coolest, and would have been the driest if general rain had not occurred on the last day of the month. Rain storms continued throughout June with the heaviest precipitation occurring in the north and central portions of the State. As much as nine inches of rain was recorded at some locations.

The waterfilled swales and ponds resulting from heavy precipitation may have encouraged wide dispersal of the broods, which may have an influence on the interpretation of the results of brood surveys.

Although we have no measure of the effect these weather conditions had on the nesting population, we are of the opinion that these conditions were abnormal and probably unfavorable.

### Spring Migration Observations

Comparative counts of spring migrants entering or passing through the State have been obtained as an index to the number of potential breeders returning to the nesting grounds.

District game biologists recording observations on sixteen sample check areas located throughout the State, reported ten of these areas to have increased numbers of waterfowl, compared to 1953. Four areas were reported as having the same number and two reported fewer migrants this year.

Aerial censuses for the past six years on Saginaw Bay, Lake St. Clair, and Lake Erie during the periods of peak "build-ups" of migrants show the following numbers of waterfowl present on all three areas:

<u>Year</u>	<u>Waterfowl</u>	<u>Year</u>	<u>Waterfowl</u>
1949	278,000	1952	160,400
1950	173,000	1953	247,500
1951	154,200	1954	291,500

Judging from the observations on sample check areas, together with aerial censuses of three major concentration areas, the number of potential nesters moving into or through the State this spring increased as compared to 1953.

### Potential Breeding Population Surveys

Surveys made to determine the comparative abundance of breeding pairs indicated a favorable nesting population. On sample check areas scattered throughout the State, District Game Biologists found a nesting population equal to the high population observed last year. The potential breeding population compared to the previous years is shown below.

<u>Year</u>	<u>Lineal Miles Censused</u>	<u>Potential Breeders Per Lineal Mile</u>
1949	85	6.80
1950	81	7.91
1951	120	8.18
1952	82	7.13
1953	95.5	12.75
1954	93.5	12.31

These sample check areas are representative of the better types of habitat in various regions of the State.

The species composition of the potential breeding population as determined on these sample check areas was as follows:

Mallard	23.0 percent
Black duck	22.0 percent
Blue-winged teal	32.8 percent
Wood duck	4.7 percent
Ring-neck duck	2.8 percent
Merganser	1.3 percent
Unidentified	13.4 percent

The results of the ground survey indicate slightly fewer potential breeders present in 1954 compared to 1953, but more than the six year average. A marked increase in blue-winged teal was noted.

Aerial transects flown in 1952 and 1953 were not duplicated this year. Unfavorable flying weather (particularly snow squalls) prevented flying for such an extended period that the presence of foliage interfered with visibility. We were of the opinion inaccurate census data would result if the survey were continued.

The following is the limited amount of comparative data that could be used. In 1954 approximately 370 lineal miles were flown on a sample from 92.5 square miles of habitat in the south central part of the State. (See Figure 1.) The numbers of waterfowl observed were: 65 in 1952, 227 in 1953, and 77 this spring. We are of the opinion that insufficient coverage was obtained to use this data for calculating potential breeding populations.

### Brood Surveys

Following the boat surveys to determine potential breeding populations, brood censuses were made on the same sample check areas to determine nesting success. Information obtained from these brood censuses can be used only as an index of production, since many broods are unobserved in the dense cover typical of our marshes.

Comparing these brood census figures with those obtained in previous years, poor production is indicated. The number of broods observed per lineal mile of census line was 50 percent lower than last year, and below the previous five-year average. The average size of the broods, however, was the highest in five years of records. Comparisons are shown below.

<u>Year</u>	<u>Broods Per Lineal Mile</u>	<u>Hens and Young Per Lineal Mile</u>	<u>Bachelor Ducks Per Lineal Mile</u>	<u>Average Size of Broods Observed</u>
1949	.47	2.75	6.50	6.00
1950	.34	2.32	5.50	5.87
1951	.35	2.20	3.31	5.76
1952	.70	3.92	3.21	4.60
1953	.51	3.63	4.32	6.10
1954	.20	1.45	4.60	6.24

In another survey a portion of the southern farm land was censused from the air to further test the practicability of aerial observations for counting broods in the least wooded portions of the State. This pilot study was started in 1952, and comparative data are available. A continuous census route was flown which included parts of the transects previously flown for breeding pair counts. This brood census route is shown on Figure 1. The sample area includes 272 lineal miles of census line one-quarter mile in width, or 68 square miles. It has been flown for the past three years. The results follow:

	<u>1952</u>	<u>1953</u>	<u>1954</u>
Bachelor birds	12	7	16
Adult female and young	5+35	11+78	5+22
Total birds	52	96	31
Young per brood	7	7.1	4.4
Broods per square mile	.073	.162	.044
Hens and young per square mile	.588	1.308	.399
Young per square mile	.514	1.147	.323
Bachelor ducks per square mile	.176	.103	2.35

Insufficient numbers of birds were observed on these aerial broods surveys to provide statistically significant figures.

The low counts obtained suggest that future aerial brood censuses should be discontinued or used only on areas of dense waterfowl populations.

Judging from the results of both the boat surveys and the aerial observation, the hatch has been below average.

### Summary

1. Comparative counts on sixteen sample check areas together with aerial counts on three major concentration areas strongly indicate increased numbers of potential breeding waterfowl entering or passing through Michigan this spring. A good carry-over of breeding stock was apparent.
2. Surveys to determine resident potential breeding populations indicate breeding pairs were present in numbers comparable to 1953, the highest of five years of records.
3. Nesting conditions were considered unfavorable for production.
4. Brood surveys indicate the nesting success was below the past five years' average.
5. Judging from the results of the various surveys, Michigan has experienced below average waterfowl production in 1954.

## WATERFOWL BREEDING GROUND SURVEY IN INDIANA - 1954

James D. McCall

### Introduction

That part of the 1954 breeding ground survey included in this report is confined to the wood duck brood production on 143 miles of stream transects, and to water conditions in the pothole nesting habitat of northern Indiana. Brood census techniques were essentially the same as those described in the 1953 report.

In addition, 65 rough lumber wood duck boxes were checked for usage and brood censusing was conducted on the Willow Slough State Game Preserve. A complete report on this work may be found in the October, 1954 Pittman-Robertson Quarterly Progress Report.

The study leader was assisted on the river floats by conservation officers and Pittman-Robertson personnel.

### Weather and Water Conditions

Drought conditions still prevailed during the early part of 1954. The cumulative effects of continued dry weather resulted in some of the lowest January river stages in years. February weather was mild with near normal precipitation. March was dry and cold with precipitation averaging 1.05 inches below normal. The first few days of April were cold with temperatures being recorded as low as +12° F in the northern Indiana. However, temperatures moderated by the 6th, and April 1954 averaged 5.7° F above normal. Pothole nesting habitat in northern Indiana received 4.50 inches of precipitation in April, which is 1.23 inches above normal. It was during April that open water started to reappear in potholes and marshes that had been dry for months. Precipitation during May and June were below normal, however, a heavy rain on July 6th and 7th, unofficially gauged in LaGrange County at over 3 inches, was encouraging. This rain was general in nature covering a major part of the pothole and lake region of northern Indiana.

Water levels continued to rise through mid-July for an average gain of approximately one foot. Of 17 pothole study areas checked for water levels during the fourth week of June, 29 percent were still dry, another 29 percent were less than two thirds full, and 42 percent were normal. Thirty-five percent of these areas were dry by the end of June, 1953.

### Wood Duck Brood Production

Difficulty has been experienced in the past in censusing breeding pairs as a basis for predicting brood production in Indiana. The 1954 breeding ground survey was therefore confined to the censusing of broods.

Table I. - Wood Duck Broods Observed in 1954 by Transects and Age Class  
Compared with 1953

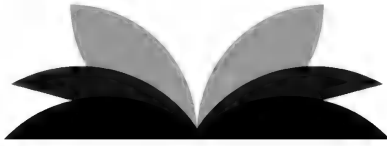
Stream	Length in Miles	Date Floated	Age - - - - Class					1954 Total	1953 Total
			Ib	Ic	IIa	IIb	IIc		
Muscatatuck	19	6/2	9	4	8	3	-	24	34
Salt Creek	15	6/3	1	2	-	-	-	3	6
Eel (Clay Co.)	13	6/8	3	4	1	2	-	10	8
White	25	6/9	2	4	9	6	4	25	12
Big Blue (Shelby Co.)	12	6/10	1	1	6	2	-	10	10
Mississinewa	13	6/15	1	1	1	2	2	7	5
Elkhart	17	6/14	-	-	-	-	-	0	5
Iroquois	14	6/16	-	1	1	-	-	2	3
Maumes	15	6/18	2	1	1	3	1	8	8
Totals	143	6/2- 6/18	19	18	27	18	7	89	91



Figure 1. Waterfowl Breeding Ground Survey, Indiana, 1954.

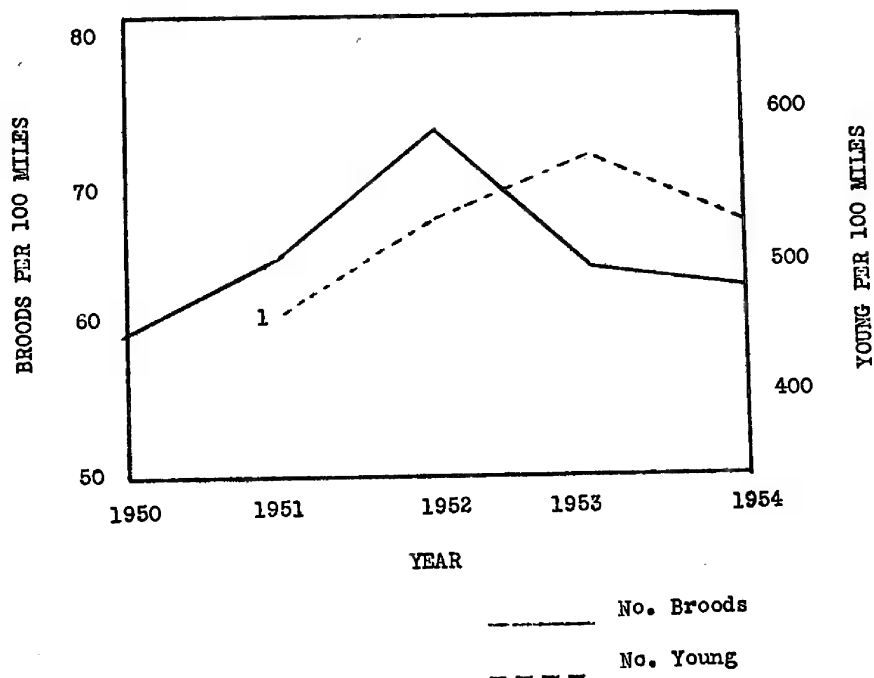


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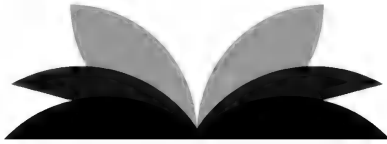


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Figure 2. Wood Duck Broods and Young Per 100 Miles of Comparable Stream Transects, Indiana - 1950 Through 1954.

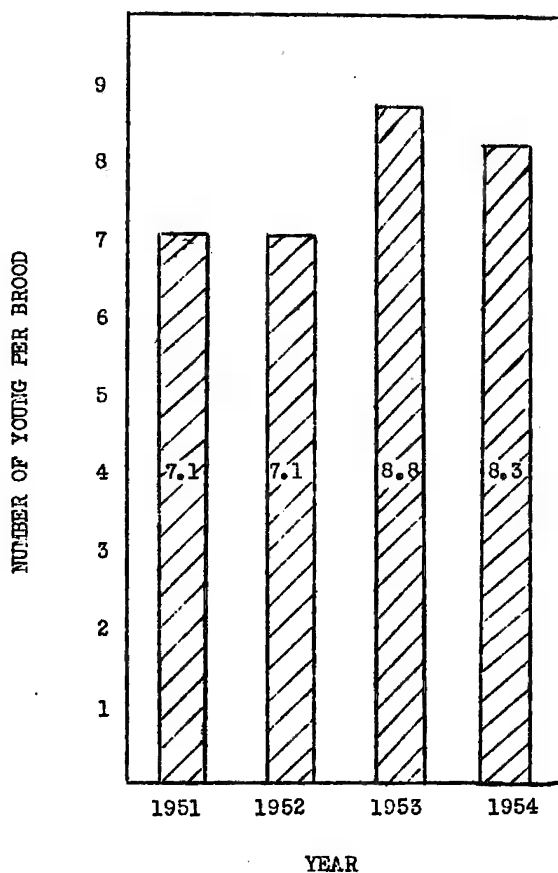


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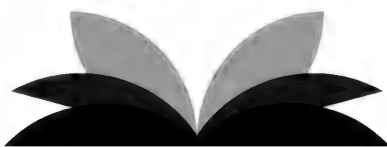
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Figure 3. Average Number of Young Wood Ducks Per brood<sup>1/</sup>, by Years, 1951-1954, Indiana.



<sup>1/</sup>. Only whole counts are used in computing average number of young per brood.

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An early check on one of our most productive streams indicated that wood duck broods were coming off about 2 weeks later than usual this year. The season's first wood duck brood seen in Indiana was observed on the east fork of the White River by William B. Barnes on May 2, 1954, and was judged to be about 3 days old. Nine stream transects were censused between May 31 and June 19, 1954. Although weather prevented the successful completion of control river floats, it is believed the survey was conducted during the period when the maximum number of broods could be observed. Stream transects were scattered throughout the State and involved a total of 143 linear miles (Figure 1).

Production on the stream transects peaked in 1952 at 103 wood duck broods, dropped to 91 wood duck broods in 1953, and to 89 wood duck broods in 1954. This amounted to an 11.7 percent drop in 1953 and an additional 2.2 percent drop in 1954.

In addition to the number of wood duck broods tabulated in Table 1, one brood of hooded mergansers was observed on the Salt Creek transect, one brood of Canada geese on the White River transect, and one brood of black ducks on the Elkhart River transect.

Using 1950 as the first year of comparable data in Indiana, 59.2 wood duck broods were observed per 100 miles of stream transects. The number increased to 64.2 in 1951, and 72.3 in 1952, but dropped to 63.6 in 1953, and 62.2 in 1954 (Figure 2). Meanwhile, the average number of young wood duck per brood was 7.1 for 1951 and 1952, increased to 8.8 in 1953, and dropped back to 8.3 in 1954 (Figure 3). As compared with 1953, the drop in broods and decrease in number of young per brood resulted in a decrease in total production of 44 young per 100 miles or 7.9 percent.

### Summary

Open water started to reappear during April in potholes and marshes that had been dry for months. A check of 17 study areas in late June revealed that 29 percent were still dry. Thirty-five percent of these areas were dry during the same period in 1953.

Wood duck broods appeared on the streams of southern Indiana about two weeks later than usual.

Nine stream transects involving 143 miles were censused for production trends. In 1953, 91 wood duck broods were observed, while 89 were seen this year. The average number of young per brood also dropped from 8.8 in 1953 to 8.3 in 1954. The total effect amounted to a 7.9 percent decrease in number of young birds observed. These same transects indicated an 11.7 percent decrease in the number of wood duck broods produced in 1953 as compared with 1952.

No summer banding was attempted this year.

# WATERFOWL BREEDING GROUND SURVEY - OHIO 1954

Delmar Handley

## Methods and Coverage

This report summarizes the findings of three methods of breeding pair surveys. One was an aerial transect flown on May 24 through the Lake Erie Marshes by the leader of the State-wide waterfowl project. Another was a series of ground checks conducted throughout the spring by area managers on the State controlled Magee Marsh and Resthaven Public Hunting areas. The final method, which was undertaken for the first time on a state-wide basis during the spring of 1954, was a float trip conducted over a number of streams throughout Ohio. This latter survey, which was initiated primarily to compile data on wood duck breeding populations, had two coverages of the same stretch of stream. One stream was unavoidably omitted on the second survey. The first of the surveys was made during the first two weeks of April and the second during the first two weeks of May.

## Weather and Water Conditions

Weather and water conditions were in general favorable to waterfowl production during the spring of 1954. The Lake Erie Marshes, which are periodically inundated by the high water levels of Lake Erie effecting heavy losses of nests and eggs, contained a fairly even water level throughout the early spring months.

The inland lakes and streams were about normal with slightly lower water levels than were experienced during the spring months of previous years.

Following are the findings from areas under observation during the spring of 1954.

Table I. - Aerial Breeding Pair Survey, Lake Erie Marshes\*

Species	Pairs		Pairs/Sq. Mi.		Percent Change
	1953	1954	1953	1954	
Mallard	122	71	8.7	7.1	- 18.39
Black	88	91	6.3	9.1	+ 30.78
Blue-winged teal	11	11	.8	1.1	+ 27.28
Wood duck	4	5	.3	.5	+ 60.00
Total	225	171	16.1	17.8	+ 9.55

\* 105 linear miles flown during 1953 (13.9 square miles).  
80 linear miles flown on same but reduced transect  
during 1954 (10 square miles).



Table II. - Waterfowl Breeding Pair Survey, Magee Marsh (1960 acres) 1953-54.

Species	Pairs		Pairs /Sq. Mi.		Percent Change
	1953	1954	1953	1954	
Mallard	31	27	10.00	8.82	- 12.91
Black	9	13	2.90	4.24	+ 30.77
Blue-winged teal	10	9	3.23	2.94	- 10.00
Wood duck	4	8	1.29	2.61	+ 50.00
Green-winged teal	-	1	-	.33	-
Total	54	58	17.42	18.94	+ 7.08

Table III. - Waterfowl Breeding Pair Survey, Resthaven (2100 acres).

Species	Pairs		Pairs/Sq. Mi.		Percent Change
	1953	1954	1953	1954	
Mallard	43	39	13.03	11.82	- 24.00
Black	25	33	7.58	10.00	+ 32.00
Wood duck	3	2	.91	.61	- 33.00
Blue-winged teal	2	2	.61	.61	-
Total	73	76	22.13	23.04	+ 4.11

Table IV. - Waterfowl Breeding Pair Surveys on Streams, 1954. (First Survey April 1 - 15, 143 linear miles.)

Species	Number Observed	Breeding Pairs	Breeding Pairs Per Linear Mile*
Wood duck	232	151	1.06
Mallard	175	-	-
Black	62	-	-
Lesser scaup	12	-	-
Blue-winged teal	117	-	-
Green-winged teal	6	-	-
Pintail	5	-	-
Merganser	29	-	-
Total	638	151	1.06

\* Unable to differentiate, with the exception of the wood duck, at this date the resident and transient ducks.

Second Survey May 1 - 15, 117 Linear Miles.

Species	Number Observed	Breeding Pairs	Breeding Pairs Per Linear Mile
Wood duck	158	118	1.01
Mallard	37	24	.21
Black	2	1	.01
Scaup	4	-	.01
Blue-winged teal	4	2	.02
Total	205	145	1.25

Waterfowl Brood Surveys

Waterfowl brood surveys were conducted on the Magee Marsh, Resthaven Area and 215 linear miles of streams by personnel of the Ohio Division of Wildlife. Both Magee Marsh and Resthaven lie in the Lake Erie Marsh region. The stream surveys were conducted on streams throughout Ohio.

Methods

Magee Marsh and the Resthaven Area were worked by foot and by boat throughout the spring and early summer for broods by the managers of these areas.

The 215 linear miles of streams, which were censused by boat as float trips, had two coverages, one in June and the other in July. Only the results of the first survey is included in this report. This is the first year for the float trips on a state-wide basis for waterfowl broods.

Success of the Season

In the Lake Erie Marsh region there was an increase of broods at both Magee Marsh and the Resthaven Area. The increase at Magee Marsh was three broods over last year with a slight reduction in the average brood size. At Resthaven there was an increase of one brood over last year with a fairly substantial reduction in average brood size.

Due to the fact that 1954 was the first year for the stream float trips on a state-wide basis, no comparable data is presented. It is interesting to note however that over 90 percent of the broods observed on this survey were wood duck.

Table V. - Waterfowl Broods at Magee Marsh (1900 Acres).

Species	No. of Broods		Percent Change	Young/Brood		Broods/Sq. Mi.	
	1953	1954		1953	1954	1953	1954
Mallard	14	9	- 35.71	5.6	4.3		
Black	8	10	+ 25.00	5.2	6.7		
Wood duck	2	3	+ 50.00	5.5	5.8		
Blue-winged teal	-	5	-	-	5.2		
Total	24	27	+ 12.50	5.4	5.3	8.1	9.1

Table VI. - Waterfowl Broods at Resthaven (2100).

Species	No. of Broods		Percent Change	Young/Brood		Broods/Sq. Mi.	
	1953	1954		1953	1954	1953	1954
Mallard	8	6	- 25.00	7.9	5.0		
Black	6	7	+ 16.66	8.2	5.0		
Wood duck	1	1	-	7.0	7.0		
Blue-winged teal	-	2	-	-	5.5		
Total	15	16	+ 6.66	7.7	5.2	4.6	4.3

Table VII. - Waterfowl Broods on 215 Linear Miles of Streams.

Species	No. of Broods	Young Per Brood	Broods Per Linear Mile
Wood duck	61	7.1	.284
Mallard	5	5.8	.023
Black	1	7.0	.005
Total	67	7.06	.312

### Summary

The 1954 waterfowl breeding grounds surveys (breeding pairs and brood censuses) in Ohio indicate that there was a small increase in both breeding pairs and broods over the previous year, but with a somewhat smaller number of ducks per brood. Therefore, it would appear that the total production should be about the same as last year.

# WATERFOWL BREEDING GROUND SURVEY - NEW YORK, 1954

Dirck Benson, Donald D. Foley and Donald Schierbaum

## Introduction

Three types of activities conducted this summer and fall have yielded data indicative of the 1954 waterfowl production. These include ground surveys, banding and aerial transect flights and are discussed separately below.

## Ground Surveys

Breeding ground survey of sample areas by ground observers in New York is partially summarized elsewhere in this report in Schuler's report on the Northeastern States. During the rearing season of 1953 some 81 small marsh units were surveyed and in 1954 a total of 181 were studied. These marsh units, averaging five acres, are all man-made and constructed under the wildlife restoration program. Table 1 presents the comparative observations for the two years.

Table I. - Comparison of Broods Observed per Marsh Unit in 1953 and 1954 in New York.

Year	Units Surveyed	Broods Observed Per Unit				Total
		Black	Mallard	Wood	Blue-winged teal	
1953	81	0.26	0.56	0.75	0.12	1.69
1954	181	0.23	0.39	0.53	0.06	1.21

While these data suggest somewhat lower brood production on the average than in 1953, the data are not conclusive. Gradually receding waterlevels in some temporary swamp and swale areas may not have necessitated as early moves to permanent units as occurred in 1953.

## Banding Studies

During the summer of 1954 a total of 1874 ducks were banded in New York State during July, August and September. During the year experimental trapping was conducted on some of the small marshes constructed by the Department as well as on the larger management areas. The trapping is summarized in Table II.

Table II. - Waterfowl Banded in New York State, June 15-September 15, 1954.

Species	Adult			Immature			Total
	Male	Female	Unidentified	Male	Female	Unidentified	
Black	21	12		339	291	2	665
Wood	44	14		318	307	2	685
Mallard	9	10		215	232	1	467
B-w. teal	1	1		15	33		50
Pintail				2	5		7
Total	75	37		889	868	5	1874

Two items in the 1954 summer banding are indicative of summer productivity. Trapping on seven marshes in western New York, in which all young were carefully aged, indicated that these marshes were being used by an average of 5.7 broods per area compared with the average visual observation of 1.7 broods for the same areas. While a part of this difference could be accredited to brood movement (while still flightless) it probably indicates that our ground surveys were only turning up a sample of the broods being reared on these small marshes.

The other banding activity indicative of production was that observed at the Oak Orchard Game Management area. Here trapping activities were started August 11 in 1954 compared with September 2 in 1953. Analysis of the take both years up to September 15 which should include largely local or regional production gave no grounds to conclude that the production for the two years was appreciably different. Continued trapping on into October however, indicated that in 1954 that either the late flight of wood duck (late September and early October) failed to exist or else it passed over the Oak Orchard area.

In addition to the ducks banded in New York State, personnel from this Department assisted in a cooperative banding project in Canada where 2016 ducks were banded thru October 31 (See Table III). Three duck trapping stations were set up in Ontario at Amherst Island, Oshawa, and Lake Scugog. A combination of adverse factors kept the Lake Scugog station from operating. These included carp, predators, and extremely soft bottom. The success of the first two stations was due to the splendid cooperation and help from many individuals, sportsmen groups, and the Canadian Wildlife Service.

Table III. - Waterfowl Banded in Ontario Canada between August 1 and November 1, 1954 in Cooperation with Canadian Wildlife Service, and U. S. Fish and Wildlife Service.

Species	Adult			Juvenile			Total
	Male	Female	Unidentified	Male	Female	Unidentified	
Black	29	72		325	184	4	614
Wood	58	12		39	26	1	136
Mallard	20	50		137	100	1	308
B-w. teal	100	61		203	231	1	596
Pintail	26	12		72	111		221
Misc.	1		3	6	1	130	141
Total	234	207	3	782	653	137	2016

#### Aerial Transects of Waterfowl Production

The fourth consecutive aerial waterfowl production survey based on a sampling plan devised by the Fish and Wildlife Service was completed during July 5 to 11, 1954. The flying was done by the same pilot and observer as have been used since this work began, John Schempp and Ed Maunton. Further modifications recommended by the Fish and Wildlife Service were carried out, which eliminated all but a few (10) cluster problem areas and greatly increased the mileage in overland transects. The methods used were similar to those described in the previous report (p. 222, Waterfowl Populations and Breeding Conditions - Summer 1953). Four rivers in different phytogeographic provinces were also covered by canoe for comparison with last year.

While direct comparisons throughout are difficult because of the changes made each year, such comparisons are made in Tables IV and V where they seem warranted. In 1954 New York generally had wetter conditions than normal, with the nesting season delayed and extended considerably. The figures given as indices, therefore, are seen to be below 1953 in most cases, but these apparent decreases were believed to have been made up by later broods.

Table IV. - Aerial Transect Census of Waterfowl Production.

Type*	Year	Waterfowl Observed per Lineal Mile		Production Index**	
		Broods	Pairs	Broods	Pairs
Alleghany	1951	0.10	0.06	1892	1135
	1952	0.01	0.03	189	568
	1953	0.014	0.10	251	1792
	1954	0.038	0.038	681	681
Beech-Maple	1951	0.14	0	788	0
	1952	0.38	0.21	788	1182
	1953	0.38	0.12	3767	1189
	1954	0.162	0.115	1606	1140
Oak-Chestnut	1951	0	0	0	0
	1952	0.27	0	1452	0
	1953	0.48	0.22	2582	1183
	1954	0.347	0.104	1867	559

\* In 1954 the following types were disregarded as providing little or no significant waterfowl production (Adirondack, Champlain, New England and the coastal tidal section).

\*\* Obtained by calculating as shown in report for 1953 (op. cit.).

Table VI. - Waterfowl Production Census by Canoe.

Type*	Mileage Coverage	Waterfowl per Lineal Mi.	
		Broods	Pairs
Adirondack			
1953 Raquette R.	13.2	0.38	0.83
1954 Raquette R.	14.0	0.50	0.79
1954 Saranac R.	6.4	2.70	3.10
1954 Jones Pond	1.0	7.00	17.00
Beech-Maple			
1953 Genesee R.	10.0	0	0
1954 Clyde R.	5.0	0.40	0.80
Alleghany			
1953 Unadilla R.	10.0	0.70	0.70
1954 Otselic R.	9.0	0.67	1.67

The Oak-Chestnut type was eliminated from the 1954 types for canoe brood work.

Table V. - Aerial Census of Waterfowl Production on Marshes - New York State.

Type*	Year	Waterfowl Observed Per Square Mile		Production Index *	
		Broods	Pairs	Broods	Pairs
Maple-Beech	1951	2.62	0.15	82	5
	1952	1.23	1.08	39	34
	1953	4.58	2.36	219	113
	1954	4.33	0.83	208	40
Oak-Chest- nut	1951	3.57	0	23	0
	1952	0	0.71	0	5
	1953	0.77	0.77	6	6
	1954	1.91	0	15	0

\* See Footnote under Table III.

Even though only one river was comparable with last year, the canoe work indicated that definitely significant and sizeable populations exist on these waterways. There seemed to be a slight increase in production in 1954 over 1953 on the portion of the Raquette River covered. A very high density of both pairs and broods (mostly black ducks) was found on a segment of the Saranac River. The Jones Pond situation was a special one where broods of ring-necks, wood ducks and blacks were found in a relatively small amount of excellent habitat.

The indication is also that more broods were eventually produced than were seen at the time, unless the picture is clouded by possible non-breeders or by the confusion in the sexing of black ducks where each single is called a pair.

#### Summary

Ground surveys indicated a slight decrease in production over 1953 but banding studies did not substantiate this. Transects flown as in the past indicated waterfowl production in 1954 as somewhat down from 1953, but this was probably explained by the wetter, later and more prolonged nesting season this year. The data gathered on the canoe work seemed to substantiate this. Reliability of the figures obtained by this transect method are, however, open to question, and it is hoped that further modification will be made of the aerial production survey especially if each State is to use the data for its own management purposes.



## WATERFOWL BREEDING GROUND SURVEY- DELAWARE, 1954

Everett B. Chamberlain

### Introduction

This report summarizes the results of the 1954 waterfowl breeding studies in Delaware. This work has been conducted annually for the past several years by personnel of the Federal Aid Division of the Delaware Game and Fish Commission. The work this year was under the supervision of the writer assisted by Burd S. McGinnes and Anthony J. Florio. Mr. Courtland Smith of Ellendale was hired to do the work on the ground study area at Primehook Neck.

### Methods Used and Area Covered

As in previous years both intensive ground coverage and aerial transects were used. However, because of a shortage of personnel and the pressure of seasonal work it was impossible to gather data from all of the permanent ground study areas. As a consequence the only one of them that was covered was the one in Primehook Neck, where work has been done every year since 1951.

In the past, intensive ground coverage of specific study areas has been supplemented by State-wide data on broods tabulated during the regular monthly aerial counts of waterfowl. In 1953 and 1954 there was a cut in the amount of money allotted for aerial work and as a consequence aerial counts during the breeding season had to be discontinued. However, aerial transects based on ecological types and on the pattern worked out by the Waterfowl Biometry Office at Patuxent Research Refuge, are still being run each year.

### Weather and Water Conditions

Precipitation, which has been decreasing each summer, was well below normal throughout the breeding season. While this had no apparent effect on migration it is believed to have influenced production. Brood production in both Delaware and Maryland was at least two weeks later than normal. It seems likely that, because of the long drought, many first nests were subject to excess predation because of exposure brought about by unusually low water levels. This resulted in an abnormal number of renestings which would account for the large number of late broods.

A summary of precipitation and temperature, covering the breeding season, appears in Table I.

Table I. - Six-Month Summary of Precipitation and Temperature, Delaware, 1954.

Month	Total For Mo.	Precipitation		Annual Dep.* From Normal	Temperature	
		Monthly Dep. From Normal	Preceding 12 Mos. (Tot.)		Av. For Month	Departure From Normal
April	2.84"	-0.80"	37.24"	- 7.26"	55.6°	+3.8°
May	2.38	-1.43	34.23	-10.27	60.6	-2.2
June	0.44**	-3.58	32.15	-12.35	72.0	+0.2
July	1.93	-2.56	30.87	-13.63	76.2	+0.3
August	5.82	+0.54	34.80	- 9.70	72.9	-0.9
Sept.	3.39	-0.41	34.55	- 9.25	68.3	+0.3

\* Average annual precipitation 44.50 inches.

\*\* Lowest recorded in 61 years.

#### Breeding Population Trends

Monthly aerial counts during the winter months have shown a general increase in the number of wintering waterfowl. However, the breeding population remaining after spring migration has not shown any significant change. This is shown below in Table II. Although there was no aerial count for May of 1954, data from the aerial transects and the permanent ground study area indicate that the 1954 breeding population was essentially the same as in previous years.

Table II. - Spring Aerial Counts of Waterfowl in Delaware.

<u>Year</u>	<u>March</u>	<u>April</u>	<u>May</u>
1954	71,393	4,321	no count
1953	42,780	6,476	1,214
1952	38,797	9,919	1,056
1951	26,374	5,180	1,193

### Success of the Season

Aerial transects were flown in July on dates established by the Waterfowl Biometry Office at Patuxent Research Refuge. These dates were determined from data accumulated in past years and, under normal conditions, would probably have given a good sample of waterfowl production. However, as is shown in Table III, only one brood was found on the transects on July 7, 1954 as compared with 18 seen on July 6, 1953. Such a reduction can only be attributed to the transects being run at the wrong time. This was proved in Maryland, where the transects run on the specified date showed results similar to those obtained in Delaware, while the same transects run two weeks later showed results comparable to those obtained in 1953.

Data from the ground study area in Primehook Neck showed a reduction in broods, but nothing comparable to the drop shown by the transect data. Here total production was 13 broods in 1954. The four-year average for the area is 16.5 broods. Table IV contains data from 1951 through 1954 on the Primehook Study Area.

Table III. - Aerial Transects by Ecological Types, 1953 and 1954.

Date	Black Duck			Mallard			Wood			Gadwall			B-w. teal			Unidentified		
	B	P*	G	B	P	G	B	P	G	B	P	G	B	P	G	B	P	G
<u>Estuarine Marsh, Unditched (154 Mi.)</u>																		
1953 July 3	10(59)	45	216		15				4	3(14)	7	4	1					
	7 9(49)	50	305		2	13		2	7	5(24)	5	14			12			
	12 14(54)	17	559		2	14		2	3		3	14					2(16)	
1954 July 6		17	91		3													
	9 1(3)	36	257															
	12 1(7)	24	329															
<u>Estuarine Marsh, Ditched (8 Mi.)</u>																		
1953 July 3		1																
	7 2(8)																	
	12 1(1)																	
1954 July 6	1(6)																	
	9	1																
	12 1(6)																	
<u>Coastal Marsh, Ditched (16 Mi.)</u>																		
1953 July 3			5															
	7 3(22)																	
	12 1(6)	2																
1954 July 6			15															
	9	3																
	12	4	12															
<u>Atlantic Slope (52 Mi.)</u>																		
1953 July 7									1(5)									
1954									Nothing									

\* Singles tabulated as pairs.

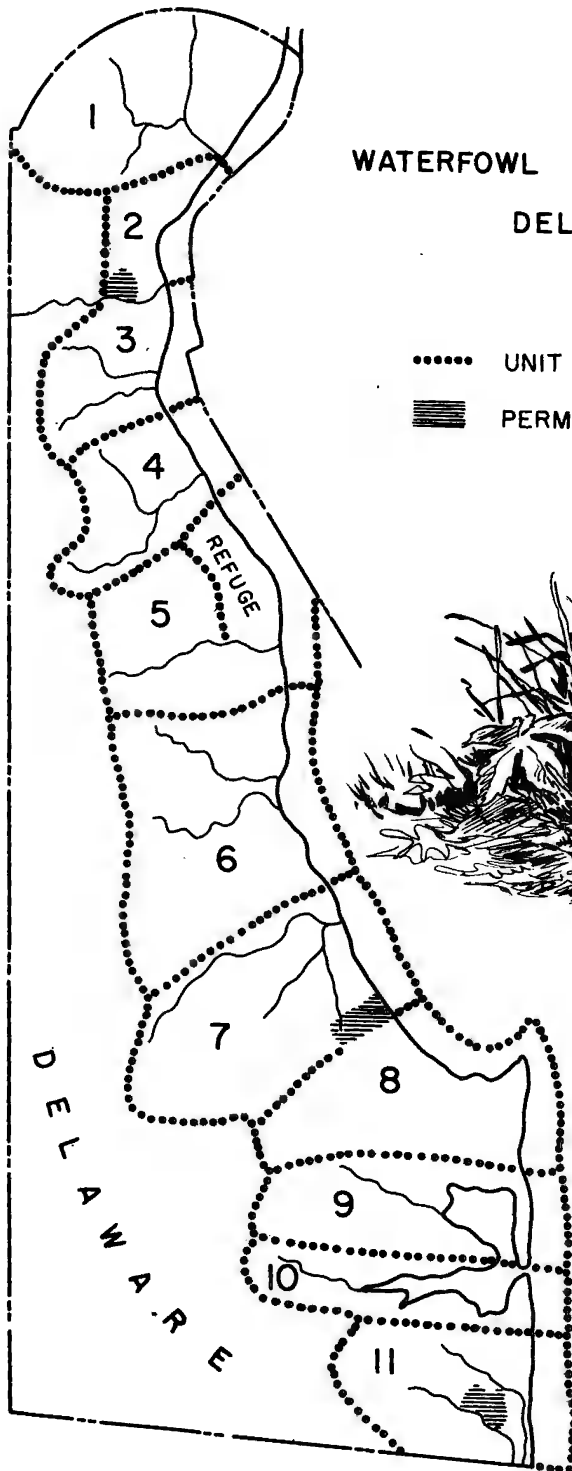
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B = Brood

P = Pair

G = Group

WATERFOWL AERIAL CENSUS UNITS  
DELAWARE - 1954

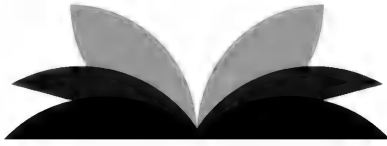


..... UNIT BOUNDRIES

▨ PERMANENT GROUND STUDY AREAS



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Table IV. - Four-Years of Data from Primehook Study Area.

Species	Number Broods				Number Young				Average Per Brood			
	1951	1952	1953	1954	1951	1952	1953	1954	1951	1952	1953	1954
Black	12	15	16	11	84	96	107	67	7.0	6.7	6.7	6.1
Wood	1	5	1	2	6	32	2(inc)	13	6.0	6.4	-	6.5
B-w. teal	1	2	-	-	8	14	-	-	8.0	7.0	-	-

### Summary

An early drought continuing through the summer was the only climatological factor influencing waterfowl production. Because of this peak broods appearance was considerably later than usual. Average brood size was smaller than in 1953 and fewer broods were seen. The probable cause for this was destruction or loss of early nests, with considerable numbers of renestings, which normally produce fewer young.

### Summer Banding

This year, for the first time in several years, State personnel did no banding on the Bombay Hook National Wildlife Refuge. Instead, an effort was made to establish other locations where banding stations can be operated. As in previous years, there was no success in obtaining young ducks from areas where they were known to have been produced. Low water caused by the prolonged drought hampered operations and as a consequence very few ducks were banded. Table V contains data from the banding operation.

Table V. - Waterfowl Banded in Delaware, Summer, 1954.

	Adult		Immature		Totals
	Male	Female	Male	Female	
Black	8	4	3	1	16
Mallard	7	7	10	12	36
B. x M. Hybrid			2	1	3
B-w. teal	12		2	1	15
G-w. teal		1			1
Pintail	1				1
Total	28	12	17	15	72

## WATERFOWL BREEDING GROUND SURVEY - NEW JERSEY

F. V. Schmidt, P. D. McLain and F. Ferrigno

### Introduction

Aerial and ground surveys of waterfowl production were conducted on established census areas in New Jersey and the results are summarized in this report. As other States in the northeast region make similar surveys utilizing similar techniques, the results obtained are valuable in determining annual production indices on a flyway basis.

Census work was accomplished by the personnel of two Pittman-Robertson waterfowl investigational projects, W-28-R and W-16-R-9.

### Techniques

Aerial and ground methods of censusing waterfowl production are employed in New Jersey. The sample design for aerial censusing of broods was originally drawn up by Earl L. Atwood, U. S. Fish and Wildlife Service, Biometrician. Reconnaissance flights in 1951 indicated that certain strata within New Jersey had populations below which it was feasible to sample by the aerial method. Therefore, since that time, transects have been flown over two strata, ditched tidal marsh and unditched tidal marsh.

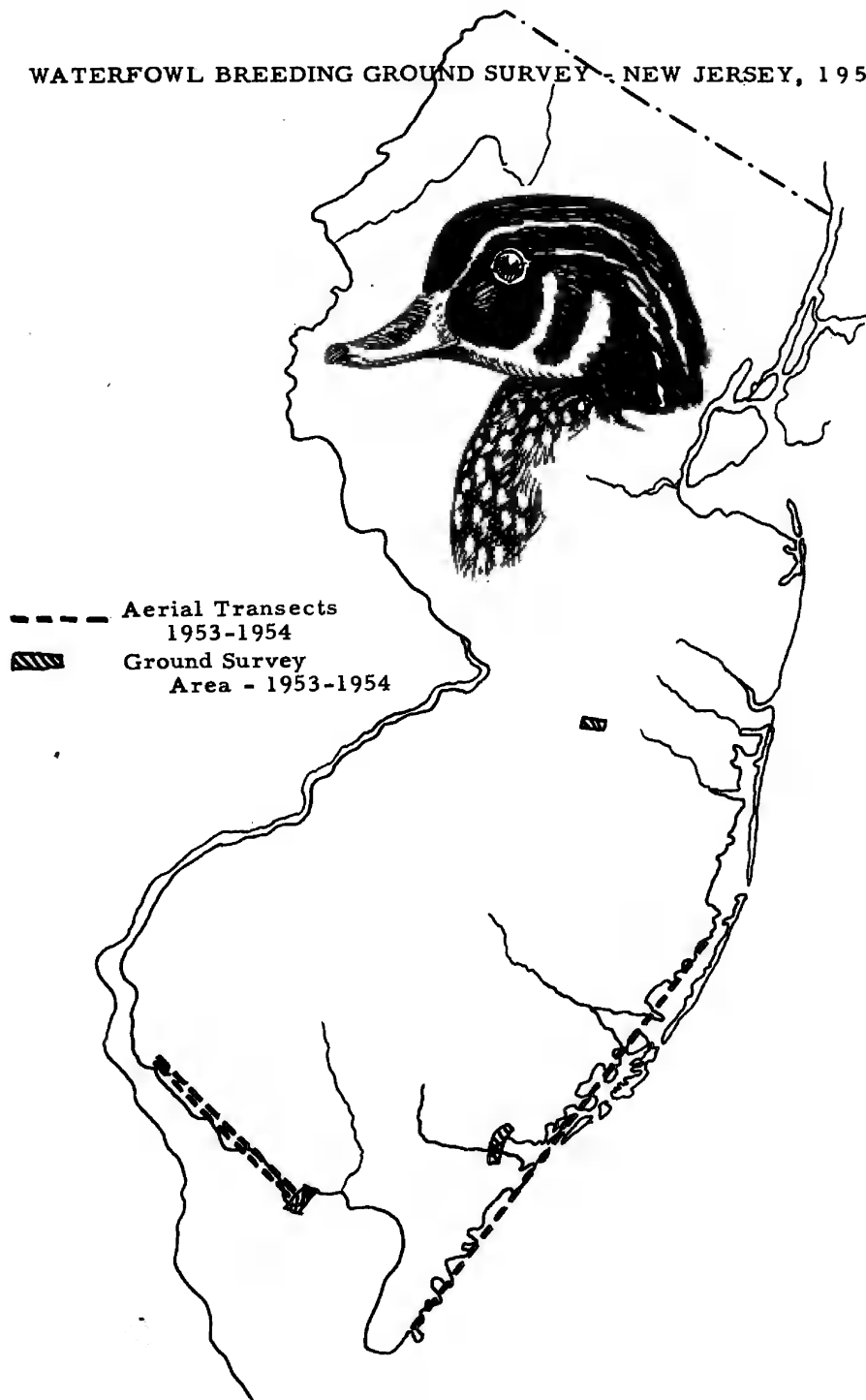
Ground observations on waterfowl production were made in the impounded areas at Colliers Mills and Tuckahoe and on the tidal marsh at Egg Island. The strip transect method is used at Egg Island with five personnel covering a one-quarter mile wide transect, three miles in length. At the Colliers Mills and Tuckahoe areas annual production figures are the result of ground observations throughout the brood season.

### Climatic Conditions

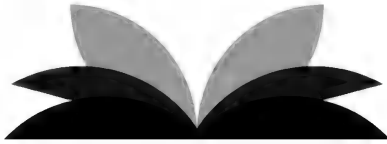
Season temperatures were experienced throughout April, May, June and July. Rainfall was normal in April and May; however, a severe prolonged drought extended throughout June and July.



WATERFOWL BREEDING GROUND SURVEY - NEW JERSEY, 1954



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### Colliers Mills-Success Lake Area, Ocean County

The Colliers Mills-Success Lake Area is geographically located in the northwestern section of Ocean County, about four miles east of New Egypt. The area is operated as a public shooting and fishing ground and consists of about 8500 acres on which eighteen lakes and ponds comprise a total water area of about 320 acres. The soil is predominantly Lakewood sand, and the overstory is mostly pitch pine (Pinus rigida) and oaks (Quercus sp.) and several white cedar (Chamaecyparis thyoides) swamps traverse the tract.

The breeding ground survey began at the inception of Federal Project W-28-R in 1951 and was continued during the springs and summers of 1952, 1953 and 1954.

### Methods of Sampling and Area Covered

Sixteen lakes and ponds varying in area from three acres to slightly over 100 acres were visited by foot twice weekly in an effort to locate broods and make observations on brood survival during the spring and summer months. Due to the dense cover in the form of standing trees and brush in most of the lakes and ponds, observations were difficult and only a section of each pond could be observed. Aerial observations were tried but the dense cover above the water level and the speed of the airplane made it impossible to locate broods which were known to be in the ponds at the time of the flight.

It is felt that the bi-weekly observations on the ponds and lakes was the most accurate method yet tried to locate broods. Although some broods were undoubtedly missed, most of the broods in the ponds and lakes were probably located at some time during the spring and summer on the bi-weekly observations. Table I presents the data collected on the brood observations and brood size during the four years of the study.

### Water Conditions

The lakes and ponds at Colliers Mills are fresh water and not affected by tides. Due to water control structures the levels of the lakes and ponds can be maintained within a few inches, even during the periods of heavy rainfall. Nest losses due to flooding are uncommon in this area.

A number of paired wood ducks (Aix sponsa) and black ducks (Anas rubripes) remained in the area until early April, and then apparently migrated, leaving the breeding populations. The first black duck brood was observed on April 26, which was the earliest brood on record.

A drought was experienced during June and July but the ponds maintained sufficient water for satisfactory brooding. The practice of partially drawing down the ponds to expose only the edges and back sections permitted broods using these ponds previous to the drawn down to remain in the pond rather than forcing them out by a complete draw down. As the vegetation grew in the exposed area in response to the draw down, the ponds were again reflooded and the young ducks could forage for insects and other foods in the flooded areas.

#### Nest Success

No systematic searches were made for nests during this study. Due to the relatively small numbers of waterfowl using the area and the dense cover in and around the ponds and lakes, it was felt that nest searches would have been impractical. Where nests were located accidentally they were observed until the nest was destroyed.

#### Success of the Season

Table I shows a summary of the four years' data on the numbers of broods observed and the average brood size per species for each year. The black duck shows an increase of one brood over 1953 and 1952 and an increase of three broods over 1951, which was the first year of the study. The average brood size increased from 1952 until 1954.

The wood duck remained at two broods in 1953 and 1954 but the average brood size increased from 6.0 young in 1953 to 6.5 in 1954. This species showed a decline from six broods in 1951 to three broods in 1952, and then remained at two broods during 1953 and 1954. This decline was also noticed in the wood duck nesting box utilization and also in the numbers of paired birds observed in the area during the early spring.

The mallard duck (Anas platyrhynchos) amounted to one brood in 1954 as compared to two broods in 1953, one in 1952, and none in 1951.

Table I. - Summary of Waterfowl Production Data Obtained at Collier Mills -  
 Success Lake Area, Ocean County, During 1951, 1952, 1953 and 1954.

	<u>Black ducks</u>	<u>Wood ducks</u>	<u>Mallards</u>	<u>Total Number Annual Broods</u>
<u>1951</u>				
No. Broods Observed	2	6	-	8
Average Brood Size	5.0	5.5	-	
<u>1952</u>				
No. Broods Observed	4	3	1	8
Average Brood Size	4.7	4.3	4.0	
<u>1953</u>				
No. Broods Observed	4	2	2	8
Average Brood Size	6.2	6.0	7.0	
<u>1954</u>				
No. Broods Observed	5	2	1	8
Average Brood Size	7.0	6.5	5.0	

### Summary

1. The waterfowl breeding ground survey inaugurated at Collier Mills in 1951 was continued during 1952, 1953 and 1954, using bi-weekly land observations on 18 lakes and ponds as an index to the breeding populations.

2. The spring was slightly colder than in 1953 and water levels in the lakes remained about the same during 1953 and 1954. A total of eight broods were observed in 1954 and all broods except one were located in ponds and lakes which were partially drawn down to encourage the growth of waterfowl foods.

3. Table I shows a comparison of the brood studies from 1951 until 1954. The black duck showed an increase from two broods in 1951 to five broods in 1954. The wood duck declined from six broods observed in 1951 to two broods in 1953 and 1954. The mallard duck fluctuated from no broods in 1951 to one brood in 1952 and the broods in 1953 and back to one brood in 1954.

4. The species composition of the broods varied in favor of the black duck during the four years, but a total of eight broods yearly were found during the study. It is believed that the partial draw down encouraged the black duck and mallards, to a lesser extent, to utilize the area due to the grassy edges and back sections of these managed ponds providing nesting and brooding cover which was not available before the ponds were placed under experimental management.

### Egg Island Area - Cumberland County

#### Nesting Season

Substantial pre-season breeding populations were reported on the Egg Island area. However, severe nest losses occurred in May and early June due to high tides and as a result, much renesting took place. Consequently, hatching dates extended throughout May, June and July.

#### Brood Season

A ground census covering approximately 480 acres was made on July 9, 1954, and 25 broods were tallied. The results of this census are tabulated and compared with a similar census made in 1953 in Table II.

Table II. - Summary of Waterfowl Production Data Obtained on the Egg Island Area in 1953 and 1954.

Species	1953		1954	
	No. Broods Observed	Average Brood Size	No. Broods Observed	Average Brood Size
Black duck	11	-	17	4.2
Gadwall	20	5.1	7	4.2
Unidentified	-	-	1	3.0
Total Broods	31		25	

The increase in black duck broods in 1954 was more than offset by the decrease in gadwall broods. Based on the census results, over-all production at Egg Island decreased about 19 percent.

#### Tuckahoe-Corbin City Area - Cape May and Atlantic Counties

##### Nesting Season

Although no systematic counts were made, general observations indicated the number of breeding pairs on the Tuckahoe area to be slightly more than in 1953. Weather and water conditions were favorable during the nesting season and no excessive nest losses were noted. The majority of nests hatched in the latter part of May and early June.

##### Brood Season

A total of 16 broods were observed in the six impounded areas at Tuckahoe. This represents an increase of one brood over 1953. Comparable data are tabulated in Table III.

Table III. - Summary of Waterfowl Production Data Obtained on the Tuckahoe-Corbin City Area in 1953 and 1954.

Species	1953		1954	
	No. Broods Observed	Average Brood Size	No. Broods Observed	Average Brood Size
Black duck	12	6.7	12	6.4
Mallard	1	7.0	2	7.0
Wood duck	2	8.0	2	-
Total Broods	15		16	

Based on total broods observed there was no significant change in brood production in 1954 as compared to 1953 on the Tuckahoe area.

#### Aerial Transects

In 1954, two flights were made over each of the aerial transects. Three flights were made in 1953. A summary of data resulting from the aerial transects is presented in Table IV.

Brood production on the unditched tidal marsh strata decreased slightly. The decrease is attributed to the lesser number of gadwall broods observed in 1954. The total number of black duck broods observed in 1953 and 1954 on the transects were about equal.

On the ditched tidal marsh strata a significant increase in brood production was noted. More specifically, this can be considered as an increase in black duck production as the broods of no other species were observed in this strata during the past two years.

#### Conclusions

Since the data, obtained from the census areas discussed above, can be considered indicative of production throughout the major breeding areas of New Jersey, the following over-all conclusions can be drawn in regard to waterfowl production in 1954. The production of mallards and wood ducks is comparable to 1953. Gadwall broods were found in lesser numbers while black duck broods showed a slight increase.



Table IV. - Summary of Data Resulting from Aerial Transects Flown in 1953 and 1954.

Date	Strata	Sq. Mi. Strata	Sq. Mi. Sample	Total Broods	Average Brood Size	Total Young
May 11, 1953	Unditched Tidal Marsh	108	9.3	0	-	-
June 10, 1953	Unditched Tidal Marsh	108	9.3	4	2.8	11
July 10, 1953	Unditched Tidal Marsh	108	9.3	12	4.6	55
May 11, 1953	Ditched Tidal Marsh	219	8.5	2	4	8
June 10, 1953	Ditched Tidal Marsh	219	8.5	1	8	8
July 10, 1953	Ditched Tidal Marsh	219	8.5	2	6	12
July 7, 1954	Unditched Tidal Marsh	108	9.3	4	3.3	13
July 18, 1954	Unditched Tidal Marsh	108	9.3	10	4.2	42
July 7, 1954	Ditched Tidal Marsh	219	8.5	6	6	36
July 18, 1954	Ditched Tidal Marsh	219	8.5	3	5	15

## WATERFOWL BREEDING GROUND SURVEY IN MAINE - 1954

Howard L. Mendall

### Introduction

This report summarizes the results of the 1954 waterfowl breeding ground studies in Maine. Such investigations have been conducted annually for 16 consecutive years by the personnel of the Maine Cooperative Wildlife Research Unit under the supervision of the writer. This year he was assisted throughout the duration of the studies by Malcolm Coulter, Richard Marquardt and Robert Weeden of the Unit staff. In addition, occasional field assistance or special data were furnished by Howard Spencer, Jr., waterfowl project leader of the State Department of Inland Fisheries and Game, by State warden Caron and by State regional biologists Aiken, Blanchard, Carson and Holmes; also by John Dudley of Calais, and Eldon Clark of the Moosehorn National Wildlife Refuge. Appreciation is herewith expressed for this cooperation.

Coverage and techniques were essentially the same as in previous years. During the past two years a few minor changes have been made in the census areas to permit better coverage within the allotted time. When old areas are abandoned or new ones added, figures from earlier years are adjusted accordingly. Thus the 1954 data are comparable.

A count of pairs and territorial males was made on the regular study areas prior to and during the early part of the breeding season. A nesting study was made to determine nesting success. Commencing with the hatching period brood checks were conducted.

### Breeding Populations

All species of breeding game ducks in Maine appeared to be somewhat decreased in 1954. In the case of the important black duck this was of little significance since it amounted to only four percent; moreover, last year's black duck population was very satisfactory. With the ring-necked duck and the wood duck, however, this year's loss came after decreases of last year as well. The wood duck dropped 31 percent a year ago and 18 percent this year. The two teal and the American golden-eye appeared to be less numerous than in 1953 although their numbers are not sufficiently high on the census areas to permit accurate measurements.

The status of the initial population of the six species of breeding ducks is as follows:

<u>Species</u>	<u>Status in 1954</u>
<u>Measured on Census Areas:</u>	
Black duck	4% decrease
Ring-necked duck	15% decrease
Wood duck	18% decrease
<u>Estimated:</u>	
American goldeneye	Slight decrease
Green-winged teal	Slight decrease
Blue-winged teal	Slight decrease

#### General Breeding Conditions

Heavy snows and sub-zero temperatures during the last week of March heralded the beginning of the most backward spring and summer season that Maine has experienced in many years. Temperatures have been below average and precipitation has been above average for the entire period. It was the wettest May in the history of the Portland Weather Bureau, with rain occurring on 24 days. Three periods of floods prevailed as follows: (1) April 16-18, very heavy and statewide; (2) May 9-11, minor, being heaviest in southern and central Maine; (3) June 27-28, of major proportions in northern Maine.

The growing season for both terrestrial and aquatic plants was retarded by more than two weeks. Waterfowl chronology likewise was retarded ever since migration, which occurred about 2 or 3 weeks late for the early migrants and a week to 10 days behind schedule for the later arrivals such as ring-necks and teal.

Judging by the data from both nests and broods, the nesting season and hatching peaks for the early breeding species were the latest since 1940. Black duck hatching was nearly 3 weeks later than last year and about 10 days later than the 15-year average. On the Unit study areas only a small proportion of the nests hatched during May; this is in sharp contrast to 1953 when over half of all black duck nests hatched during that month. The late migration and the retarded season delayed nesting for many of the birds. Also the April flood undoubtedly wiped out the majority of nests in existence at the time; although many of the birds so affected were able to re-nest, they did not produce many young until June or July. On the other hand, the normally later nesting teal and ring-necked ducks were much closer to their usual schedule. Ring-necks nested only about a week later than a year ago and at close to the 15-year average dates. However, ring-necks, and also wood ducks, had a very prolonged nesting season with numerous hatches at very late dates. This indicated that these species, like the black duck, were forced to do more than the usual amount of re-nesting. Latest hatchings by species recorded on Unit study areas were: wood duck, July 27; black duck, July 30; ring-necked duck, August 11.

Some interesting comparisons on nesting dates were tabulated for the black duck and the ring-neck as follows: In 1953, 22 percent of all recorded black duck hatchings took place prior to May 15 as against only one percent this year. Last year 10 percent of the black duck hatch occurred in July but in 1954 the figure rose to 18 percent. With the ring-necked duck 13 percent of this year's hatch came after July 20 whereas a year ago the figure was less than one percent.

#### Nesting Success

During the nesting study a total of 87 nests was located, 79 of which were of two species - black duck and ring-necked duck. All but one of these were re-checked to determine success or failure.

In spite of the retarded and prolonged breeding season, nesting success, at 63 percent, was slightly higher than a year ago, although this figure is below the long-term average. Thus, it is obvious that many of the re-nesting efforts were successful. Black ducks showed the highest success with 65 percent. This is unusual since both ring-necks and wood ducks ordinarily are more successful at nesting than blacks.

Nest failures were attributed to several causes but over 40 percent of all losses this year were the result of mink predation. More losses have been charged to mink than at any time in the past 16 years. For the third consecutive year crow predation was very light. Flood losses among the nests under observation were somewhat lower than expected. However, the figures may not reveal the true importance of this factor because several sections of Maine which were hardest hit by floods are not included in the areas where the nesting studies were conducted. Furthermore, during nest hunting it is purely accidental to discover a nest that has already been flooded. More than the usual number of unattached female ducks were encountered during late June and early July - birds which did not appear to have either nests or broods under their care. This would indicate nest losses under conditions where re-nesting did not take place, at least successfully. It is probable that the black duck suffered more heavily from floods than any other species, and that northern and eastern Maine was affected more adversely than other parts of the State.

#### The Brood Season

Brood studies were carried out until the latter part of August. Data were obtained on 160 complete broods classified by age. These figures are presented in table 2. Averages from Class I and Class II broods are not significantly different from those of 1953. However, the overall Class III average (5.5) is substantially higher than the 4.9 figure of a year ago. This indicates better rearing conditions this year, a situation that is attributed largely to the high water of July and August. The excessive precipitation, an adverse factor for nesting, proved beneficial for rearing young. Of particular interest in this respect were the figures for the black duck. An average loss of only 1.1 ducklings per brood was noted from the downy stage of Class I to the nearly fledged group in Class III.

### Summary and Conclusions

1. All species of breeding game ducks were decreased at the start of the 1954 nesting season. Heaviest losses were recorded for the ring-necked duck and the wood duck.
2. It was the most retarded and prolonged nesting season since 1940. Excessive precipitation and below average temperatures prevailed throughout the entire spring and summer.
3. Three periods of floods are believed to have caused more nest losses than usual. Mink predation on nests was the highest in 16 years. Nevertheless a relatively large proportion of birds, particularly in central and southern Maine, appeared to have re-nested successfully, and over-all nesting success is believed to be little different from a year ago.
4. Because of the consistently high water of July and August, rearing conditions for broods were better than last year.
5. In considering all aspects of the 1954 breeding season, the improved rearing conditions for broods, as well as a considerable amount of successful re-nesting, partially offset the initial population decreases and the heavy early nest losses. It is believed that the ultimate productivity of Maine's marshes was only slightly lowered from that of 1953. Nevertheless this marks the second consecutive year of a general decline.

Table I. - Waterfowl Census Data - Number of Breeding Pairs

Study Area	Black Duck Pairs		Ring-neck Pairs		Wood Duck Pairs	
	1953	1954	1953	1954	1953	1954
St. John River, Van Buren - Madawaska	10	7	--	--	--	--
Portage Lake, Portage	4	8	18	15	4	2
Meduxnekeag Stream, Hodgdon	5	4	--	--	3	2
Musquash Stream, Grand Lake Stream	20	15	13	10	--	--
Pocamoonshine-Crawford Lakes	45	25	55	40	4	3
St. Croix River, Baring	12	10	--	--	3	3
Moosehorn Refuge, Calais	31	40	4	9	1	2
Pennamaquan River, Pembroke	5	3	18	13	--	--
Great Works Marsh, Edmunds	6	10	5	8	--	--
Scammon Pond, Eastbrook	5	6	4	6	5	2
Boyden Lake, Perry	--	--	--	--	1	2
Mattanawcook Lake, Lincoln	1	1	6	2	--	--
Penobscot River, Lincoln-Enfield	16	15	--	--	7	8
Davis-Holbrook Thoroughfare, Eddington	5	4	4	0	--	--
Corinna Stream, Corinna	7	6	14	5	4	5
Goose River, Belfast-Swanville	8	18	12	22	--	--
Snake Pond, Brooksville	--	--	5	4	--	--
Ruffingham Meadow, Searsmont	--	--	--	--	8	4
T o t a l s	180	172	158	134	40	33

Table II. - Average Brood Sizes by Age Classes

Species	Total Broods	Class I		Class II		Class III	
		Broods	Av. Size	Broods	Av. Size	Broods	Av. Size
Black duck	65	25	7.0	25	6.3	15	5.9
Ring-necked duck	64	32	7.6	22	6.3	10	5.9
American golden-eye	17	4	6.0	4	4.2	9	3.7
Wood duck	9	2	9.5	3	2.7	4	7.8
Hooded merganser	2	--	--	--	--	2	4.5
American merganser	2	--	--	--	--	2	6.0
Blue-winged teal	1	--	--	1	7.0	--	--
T o t a l s	160	63	7.3	55	6.0	42	5.5

## WATERFOWL BREEDING GROUND SURVEY, THE NORTHEASTERN STATES, 1954

Francis B. Schuler

### Introduction

This report on waterfowl production is based on data and written opinions of personnel in the Fish and Wildlife Service, the States and private cooperators. It was collected in the same manner as in previous years.

The number of comparable areas increased by approximately 30 percent over last year. The increases occurred in Connecticut, Delaware, Maine, Massachusetts, New York and New Hampshire.

### Weather and Water Conditions

Early spring was cold and wet throughout the Northeast. Low daily temperatures retarded vegetative growth in the more southerly sections and delayed the spring break-up in the North. In some sections of Main, "ice out" was reported as being three weeks later than normal. Rainfall in the southern portion of the region was below normal in May and June. Drought conditions prevailed in June and early July with a resulting drop in water levels from New Jersey southward. A series of high tides during spring and early summer was reported on the coastal marshes of New Jersey. Precipitation continued above normal over much of New York State and New England from May through the first week of June. It was the wettest May in the history of the Boston and Portland Weather Bureaus. Average temperatures were below normal for this period. Flood waters were reported in April and May from many of the steeper drainages in Maine, New Hampshire, and New York State, although in the Lake Plain section of the latter State, the high waters were reported as being favorable. Later, water levels in the northern portion receded gradually, although still above normal for mid-June and early July.

### Breeding Population Trends

Reports from the majority of observers throughout the region indicated the breeding population to be ample for production; some thought the number of birds present exceeded last year. Early nesting was reported in the South, while New England and New York State reports indicated the nesting season was late. A few observers reported nesting birds during the first week of July. The high waters experienced during May and June were reported to have destroyed many nests, and late nestings observed this year are quite likely renesting attempts. Some area reports indicate that high water two to six feet above normal may have caused birds to desert their usual nesting and rearing areas for others on which we have no reports.



### Brood Production

The summary of production data from 168 comparable areas is presented in Table I. There appears to be no significant change in the number of broods produced. The average brood size is lower for the two most important nesting species--black duck and wood duck. Many observers reported difficulty in finding the birds due to high water, which kept the broods back in the heavy cover. There seemed to be unanimity in the excellent rearing conditions.

### Summary

Table I indicates no significant change in production in the Northeastern States. Late season and high water, with resultant late nesting and reneating attempts, make the data presented in Table I conservative in nature. Populations of the principal species, the black duck and the wood duck, will be at least as high as last year, with a good possibility of improvement.

Table I. - Summer Brood Survey in the Northeastern States, 1954. (168 Comparable Areas\*)

Species	Total Broods		Young Produced		Average Brood		Percent of Change			
	1954	1953	1954	1953	1954	1953	Young Produced		Broods	
							Increase	Decrease	Increase	Decrease
Black duck	373.0	380.0	2,171.0	2,310.2	5.8	6.1	-	6.0	-	1.8
Wood duck	478.0	445.0	4,230.5	4,101.3	8.8	9.2	3.1	-	7.4	-
Mallard	95.0	93.0	499.4	592.4	5.2	6.3	-	15.7	2.1	-
Blue-winged teal	20.0	22.0	157.1	162.0	7.8	7.4	-	3.0	No Change	

\* Number of areas by States, 1954 (parentheses indicate number of comparable areas in 1953):

Connecticut 43 (24); Delaware 3 (6); Maine 27 (13); Massachusetts 43 (40);  
 New Hampshire 14 (10); New Jersey 7 (10); New York 16 (7); Rhode Island 12 (14);  
 West Virginia 2(4); Virginia 1 (1).

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